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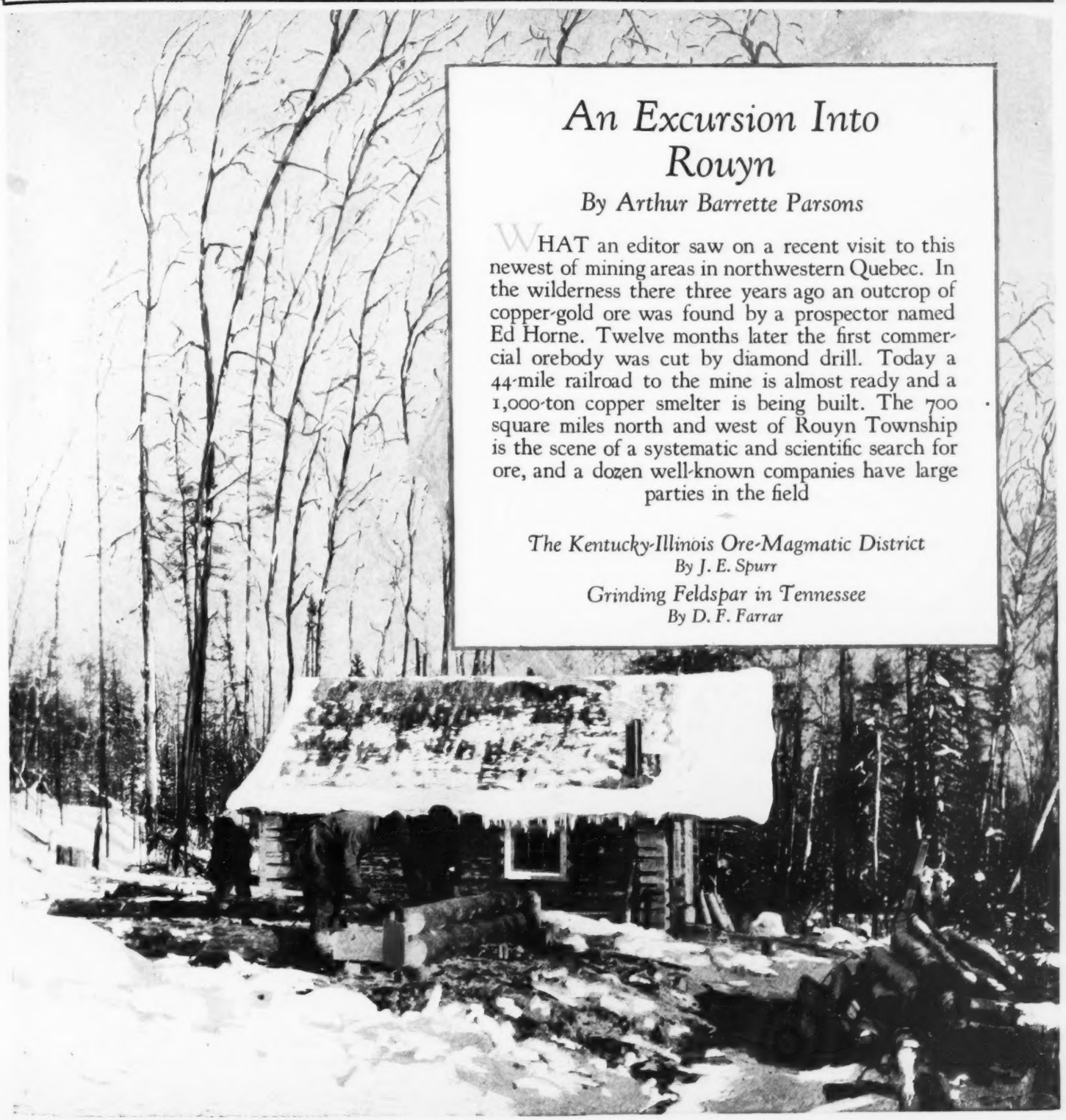

An Excursion Into Rouyn

By Arthur Barrette Parsons

WHAT an editor saw on a recent visit to this newest of mining areas in northwestern Quebec. In the wilderness there three years ago an outcrop of copper-gold ore was found by a prospector named Ed Horne. Twelve months later the first commercial orebody was cut by diamond drill. Today a 44-mile railroad to the mine is almost ready and a 1,000-ton copper smelter is being built. The 700 square miles north and west of Rouyn Township is the scene of a systematic and scientific search for ore, and a dozen well-known companies have large parties in the field

The Kentucky-Illinois Ore-Magmatic District
By J. E. Spurr

Grinding Feldspar in Tennessee
By D. F. Farrar

A Rouyn camp of the Noranda Mines, Ltd., on the Allbright-McKay claims last winter

New Cornelia Copper Co.
Ajo, Arizona
H. KENYON BURCH, *Cons. Eng.*

Equipment in the New Cornelia Concentrating Mill, at Ajo, Ariz., and Accessory Operations

Equipment	Trade Name or Type	Manufacturer and Address
Steam shovels		
Standard-gage ore cars	Osgood Model 105	Osgood Co., Marion, Ohio
	20-yd. automatic air side-dump cars.	
Pan conveyors		Case Crane & Engineering Co., Kilbourne & Jacobs Division, Columbus, Ohio
Gyratory crushers	McCully	Stephens Adamson Manufacturing Co., Aurora, Ill.
	Gates Style K	Corporation, Cudahy, Wis.
Motors and electrical equipment		Allis-Chalmers Manufacturing Co., Milwaukee
Conveyors	Ball-bearing	Stephens-Adamson Manufacturing Co., Aurora, Ill.
Rolls		
Ring grizzlies	Burch	
Weightometers		
Rod mills	Marcy	Stephens-Adamson Manufacturing Co., Aurora, Ill.
Classifiers	Dorr	Queen City Foundry Co., Denver, Colo.
Tables	Plat-O	The Dorr Co., Denver, Colo.
Thickeners	Dorr	Deister Machine Co., Fort Wayne, Ind.
Vacuum filters	Drum	The Dorr Co., Denver, Colo.
Vacuum pumps		Oliver Continuous Filter Co., San Francisco, Calif.
Compressors		Ingersoll-Rand Co., El Paso, Tex.
Blowers	Turbo	Ingersoll-Rand Co., El Paso, Tex.
Magnetic clutches		De Laval Steam Turbine Co., Trenton, N. J.
Centrifugal pumps		Cutler-Hammer Manufacturing Co., Milwaukee
Wood stave pipe		De Laval Steam Turbine Co., Trenton, N. J.
Plunger pumps		Pacific Tank & Pipe Co., Los Angeles
Dayton couplings		Worthington Pump & Machinery Corporation, Cudahy, Wis.
V-notch meter		Youngstown Sheet & Tube Co., Youngstown, Ohio
Cranes	4,000 g.p.m. Yarway-Lea	Yarnall-Waring Co., Philadelphia
Conveyor belts		Pawling & Harnischfeger Co., Milwaukee
		Goodyear Tire & Rubber Co., Akron, Ohio
		Goodrich Rubber Co., Akron, Ohio
		New York Belting & Packing Co., New York
		Manhattan Rubber Manufacturing Co., Passaic, N. J.

"Conveyors by S-A"

PRACTICALLY from the time the ore is first received from the steam shovels, at this New Cornelia Copper Co. plant at Ajo, Arizona, it is handled by conveying equipment built by Stephens-Adamson Mfg. Co.

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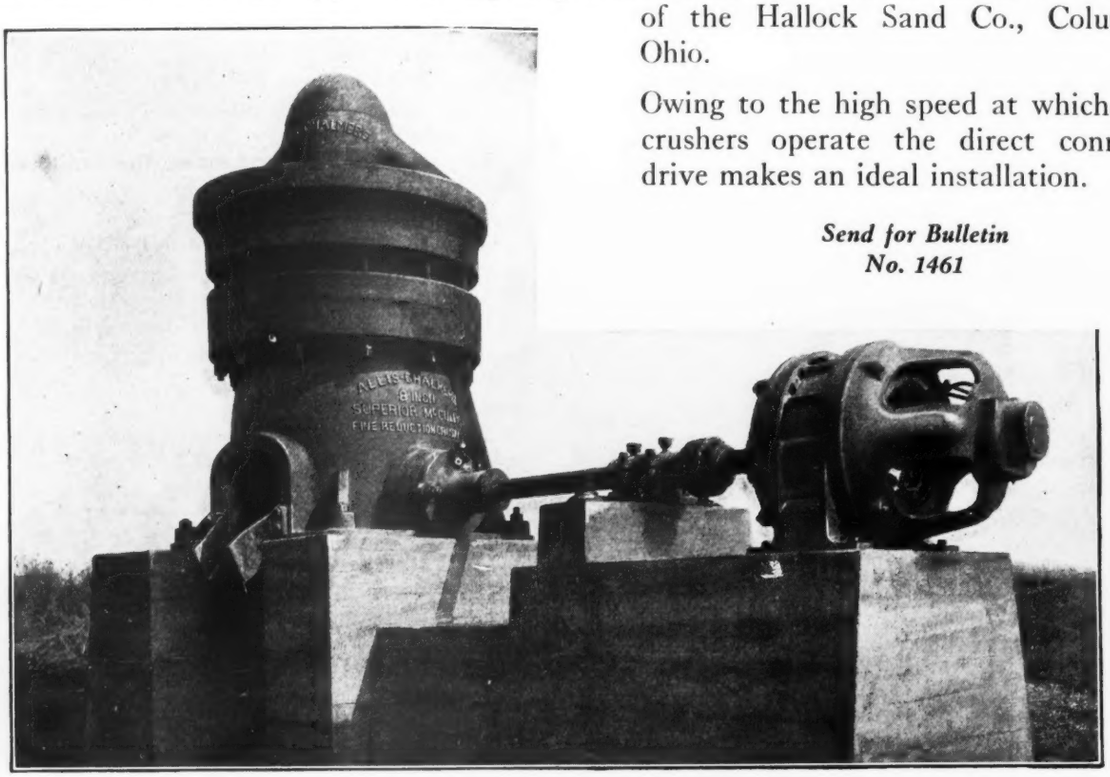

SIZES, CAPACITIES, HORSE POWER AND WEIGHTS

Size of Crusher in Inches	Two Feed Openings Size Each in Inches	Capacity Per Hour in Tons of 2,000 Pounds — Size of Discharge Opening in Inches												Driving Pulley		H.P. Required	Weight of Crusher in Pounds
		¾	⅞	1	1¼	1½	1¾	2	2¼	2½	3	3½	4	Size in Inches	R.P.M.		
6	6x40	24	28	32	40	48								36x12½	500	40 50	32,000
10	10x52					80	94	107	120	135				36x18½	450	75 100	64,000
18	18x68									250	300	350	400	44x25	400	200 250	182,000

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ENGINEERING AND
MINING JOURNAL

JOSIAH EDWARD SPURR, Editor

Volume 122 New York, October 30, 1926 *Number* 18

More Light Wanted on Zinc Sales

ON ANOTHER PAGE a mine operator in the Joplin district calls attention to inaccurate reports of the metal markets given in some of the daily metal trade papers, being kind enough to exempt *E. & M. J.* as a source of misleading information. He complains specifically that the market was often quoted as quiet or inactive in September, by the daily papers, when, as a matter of record, "statistics later showed the actual volume of sales to be at record figures." There is some truth in what he says, though certain explanations are in order. For one thing, the statistics show shipments, and not sales; the sale is often made in one month and the shipment in another. In the second place, the market may be very quiet for a few days, and then be excessively active for a time. For instance, the zinc sales reported to *E. & M. J.* in the week ending Sept. 15 were three times as great as in the week ending Sept. 8. Reference to our market report in the Sept. 18 issue shows a report of the heaviest buying in months. In the third place, it is probable that the market reports in some of the daily papers are inaccurate owing to ignorance of the actual conditions, rather than to a willful desire to mislead. None of these papers have access to much confidential information regarding sales and purchases of the leading interests, without which it is manifestly impossible to appraise the market correctly at all times.

Engineering and Mining Journal has been making every effort properly to report the zinc as well as other metal markets, and the service now is much improved over what it was at one time. Conferences and communications with the secretary of the Tri-State Zinc and Lead Ore Producers' Association have been helpful, and producers have shown even more co-operation than was expected in reporting sales, not only by mail but by telegraph and telephone. The American Zinc Institute, for the last four months, reports domestic shipments totaling 215,000 tons. Of this, about 60 per cent was probably of Prime Western grade, or 130,000 tons. In this period, *E. & M. J.* received reports, with prices realized, of the sale of 81,000 tons, or over 60 per cent of the Prime Western zinc made. The amount that was actually sold was certainly much less than that made, for some companies themselves use the zinc they make, so that it may be safely said that the *E. & M. J.* quotations are based on by far the largest part of all the Prime Western zinc that is sold. In the last month special effort has been made to see that all sellers report their business on the same basis, so that any unusual conditions may be discounted. The quotations, of course, are not perfect, but they should be the most accurate of any published; as time goes on both they and the unbiased market comment accompanying them should show still further improvement.

Mr. Chapman's argument that some definite figure should be published showing sales made is not a new one. We should like to give this information, but the sellers who report to us are in most instances unwilling to have the actual figures of total tonnage revealed. They feel that it would be giving valuable information to the buyer, who would give nothing in return. It is felt in the trade that the consumers already have altogether too much information, one of the specific complaints being that as soon as a sale is made all the potential buyers know of it, and are familiar, also, with most of the particulars.

Cripple Creek

SLIGHT FAMILIARITY with the mining news of the day is necessary for one to note that certain well-known districts are rarely mentioned, while others enjoy the limelight. One is apt to hasten to conclude that the former are passé or passing, or that peculiar circumstances dictate silence to the operators. To a large extent this of course is true, but there are exceptions.

Recently in Cripple Creek a visiting member of *E. & M. J.* staff was asked why so little was ever published on the district. It was steadily turning out a half million in gold per month, it was said. The Portland — the district's premier shipper — was milling monthly between 17,000 and 20,000 tons of $4 to $6 ore and shipping an appreciable quantity of higher grade as well. The Cresson followed in tonnage shipped, with ore considerably richer, and several other producers graced the list. Much leasing besides was done.

True, Cripple Creek is far from dead. How long it will stay on the mining map none can tell. As long as ore of commercial grade is found it will be mined, and even the operators cannot predict how long this will be for the district as a whole. There the rule for finding ore is, as in many another camp: if not in one place, look in another. In its deep development lies the district's hope. In this direction the studies of G. F. Loughlin, of the Geological Survey, have aroused much interest.

Districts that are young and flourishing furnish frequent topics for a writer's pen. Demand stimulates supply of articles—news and technical. Keen interest in a district where much is happening means many readers and much discussion, and discussion leads to further articles—spontaneous writings of those who by residence in the district or examinations of it have become familiar with its details and its problems. Where little is heard about a district that is really active its operators have themselves to blame if the idea prevails that it is either dead or dying. It pays to advertise —here as elsewhere. This is only true if there is something worth the advertising. Otherwise the silent ones are wise.

Free Trade for Europe

IT HAS LONG BEEN RECOGNIZED by unbiased students that the tariff walls set up by every country in Europe against every other country produced great difficulties in the way of profitable trade, and excluded the normal return to prosperity, not only to each country but to the whole of Europe. It is as if each state of the United States had erected high tariff barriers against every other state—as if the iron of Minnesota could not find its way to Pittsburgh without heavy tariff charges, or the shoes of New England could not be sold in New York except after paying similar levies. The prosperity of the United States is clearly due to this—to the principle of free trade (among its component states)—rather than to the principle of tariffs, as so frequently claimed. Great natural resources, energetic people, and freedom from trade restrictions over such a tremendous area that most of the goods and supplies needed are both purchased and sold within it, is the secret of America's prosperity. As evidence that this area of free trade might be profitably further extended is the effort of a Republican administration during President Taft's term of office to extend the free trade area to Canada, a movement which failed not for economic but for political reasons.

Now a group of the leading bankers of all Europe and of America recommend the same principle to Europe—that the different states of Europe declare free trade among themselves, and enjoy the prosperity and power which the removal of these shackles would liberate. This is the only way, they declare, that Europe can rise; the only way, Europeans declare, that they can free themselves from the financial and economic domination of America. There is no doubt that it would be a most beneficial move, as the American banker signers of the document cheerfully agree—adding, of course, that America desires Europe's prosperity. The bankers' agreement is approved by the International Chamber of Commerce, which includes representative American delegates.

As a frank argument for free trade, indorsed by American bankers, most of whom support Republican principles, the enunciation of this economic doctrine has aroused bewilderment in political circles, both in the United States and abroad. The President at once reaffirms the high tariff policy of his party; and even the signatory bankers say that in pointing out the virtues of free trade for Europe they are not criticizing the present policy of the United States. Europeans, on their side, jeer at the American attitude favoring free trade for Europe (so that Europe may prosper and pay its debts to America, they say), while insisting that America retain her tariff walls against European imports.

But, after all, there is not the discrepancy that these critics imagine. The United States is not a country in the sense of Western and Middle Europe—it is a vast confederation of many states. An economic United States of Europe would be an analogy. Should this United States of Europe, emulating the example of the United States of America, set up tariff barriers against the rest of the world, the situation would doubtless result in a far greater prosperity than Europe now enjoys; and as far as America is concerned, the score would be even. Whether America and Europe could then afford to consider lowering the outside wall, could next be taken into consideration. In the United States there is no doubt that certain tariff restrictions are unnecessary and harmful, and serve private or restricted profit rather than the general welfare.

Efficiency in the Geological Survey

A VISITOR to the Interior Department one day recently would have seen a heartening spectacle. On the auditorium stage were heaped more or less used inkwells, pens, pads, sponges, pencils, waste baskets, and other office appurtenances; and a number of employees, white, colored and half-and-half, were engaged in sorting these materials into piles, as junk dealers sort over and classify their spoils. This was the results of the latest economy raid in the Geological Survey and other Interior Department bureaus, by orders of that illustrious executive, Secretary Work.

The discovery had been made by the snoopers or "inspectors" who now represent an essential part of the Interior Department personnel, that many of the Survey geologists had as many as half a dozen lead pencils, two inkwells, and six or seven writing pads, and as a result of the exposure of this deplorable condition the raid was staged; and the inspectors and their crew went through with the efficiency of army ants. Two pencils, it is reported, were left to each geologist, and one writing pad, one inkwell, and so on.

As the visitor looked, he might have seen a negro with a truly remarkable equatorial circumference entering with a waste basket half full of ink-stained small sponges, which he added to the pile on the platform, where five or six employees were devoting their trained intellects to the segregation. The whole lot of junk could have been picked up for a low figure at some second-hand auction; yet the economy campaign of the Interior Department demands that these be seized, gathered up, assorted, stored, and eventually doled out again. Economy, it appears, must be secured, no matter how much it costs. This was only one of a series of similar raids, for unlike the army ant, which is accustomed to visit houses in the tropics yearly, the Interior snoopers arrive every little while. Recently it was on books that the war was waged. The detecatives discovered that some of the geologists had many books littering up their offices—a procedure evidently contrary to good office management—so the number of books which any one geologist could use or possess in his office at one time was strictly limited by decree. It is, however, rumored that there is a certain amount of bootlegging going on, in the matter of books.

All Work and no let-up must eventually have its effect on the morale of the men who are ruled by the sanitarium-trained executive—men who are mere scientists, and must be supervised, organized, and regulated in every detail, according to the existing policy.

Foreign Trade of Increasing Interest

ONE OF THE MOST INTERESTING bulletins emanating from Washington is the quarterly publication of the Foreign Commerce Department of the Chamber of Commerce of the United States, entitled "Our World Trade." Total domestic exports during the first half of 1926, according to this bulletin, were 7 per cent less in value than during the same period in 1925, though of course the value of many individual commodities exported registered material in-

creases. Corn showed the greatest gain, and second comes mining and quarrying machinery, with a gain of 63 per cent, closely followed by structural iron and steel, gaining 61 per cent; construction and conveying machinery, 55 per cent; and oil-well machinery, 48 per cent. It is evident that American mining machinery is becoming increasingly popular in foreign countries and that American mining machinery manufacturers are actively out for export business. Mining, of course, is an international industry, and those who follow it must look beyond political boundaries. It is of interest to note that 32½ per cent of the circulation of *Engineering and Mining Journal* is outside of the United States, broadcasting the news of new processes and equipment.

On the basis of quantity, the greatest and most striking percentage gain in exports is shown to be in zinc ore and concentrates, which increased from a little less than 3,000,000 lb. in the first half of 1925 to 136,000,000 in 1926, or 4,601.4 per cent, as the Chamber of Commerce statistician meticulously calculates it. This reflects the dependence that the European smelters have recently come to place on American ores.

Without intelligent thought one would never guess what country supplies the most valuable portion of imports into the United States. Great Britain, one might suppose, or possibly Canada, or maybe Cuba with its sugar; but it is none of these. It is British Malaya (Straits Settlements), this remote region sending us $236,000,000 worth of commodities during the first half of the year. Most of this was rubber, of course, though tin is also an important product of the Malay Peninsula. A striking increase occurred in American imports of aluminum, which rose from a value of $2,698,000 in the first half of 1925 to $8,941,000 in the same period in 1926. Aluminum imports are likely to gain further now that the immense project at Arvida, Quebec, with its potential production of 200,000 tons a year, is coming into operation. Prices in the United States are sufficiently high so that the 5c. per lb. duty can be paid on an increasingly large tonnage, produced at points where there is plenty of cheap water-power, and where bauxite is available without undue transportation costs.

Trend of Prosperity

THERE has been a consistent high level of business ctivity during the present year, characteristic especially of the manufacturing industries. Metal mining as a whole has also been prosperous. The consumption of electrical power and also the production of bituminous coal, two indices of industrial activity, both promise to reach high levels in October. Distribution of manufactured goods is also very active. Sales by department stores are likewise larger than last year.

Under all these favorable conditions, and with every industrial index available to economists highly favorable, and with business sound by every test, a continued increasing prosperity is apparently ahead. We say apparently, because the history of major industrial swings in the past is too persistent to be lightly regarded, even with due respect for the theory that the Federal Reserve system and the wider interchange of business statistics has made sharp fluctuations unnecessary and antiquated. Indeed, it is actually the opinion of some of the best economic and financial authorities that a period of dullness may follow in the latter part of the present year or the earlier part of next year.

The Plight of Silver

THE PLIGHT OF SILVER is one of the most significant features of the day. Unsettled by the repeated catastrophies of its partial abandonment as a metal for small coinage in many European countries, by the use of substitutes in the arts, and by political unrest in China, the announcement of the probable establishment of a closer approximation to a gold standard in India has further undermined its position. These are weaknesses which have been effected by the demand. A cause of price weakness which has depended upon the supply is the improvement of metallurgical methods, enabling the cheaper recovery, not only of silver, but of mixed ores containing copper, lead, and other commoner metals, together with silver. Much of this byproduct silver is produced and sold regardless of cost, regardless of price: and it will always be dumped in this manner. The increased consumption of the baser metals will mean an increased supply of this silver, with increasing control of the price thereby. The sufferers in the mining industry will therefore be chiefly the mines in which silver—or gold and silver—are the chief products. The two noble metals are unfortunate alike in that the demand for them runs counter to that of the more robust industrial metals—there is no great popular clamor for them. Already there comes news of certain "straight" silver mines which have closed down, or may soon, as a result of the dropping price: this is reported of certain mines in Guanajuato, Mexico, for example.

Campaigns for increased use of silver have been preached—increased use for table ware and as coinage. *Engineering and Mining Journal* indeed long ago advocated such a marketing campaign: and the Silver Producers' Association in co-operation with the Silversmiths Guild has been engaged at this work for six months. This is excellent, but far from being enough.

One suggestion that has been made is for a world control of silver marketing. This suggestion involves the placing of the marketing of silver in the hands of a single agency—say in London—which would prevent competition, fix the price, and inferentially limit and distribute the production. There are many economic and business difficulties in the way of this plan—not the least of which is the flood of byproduct silver (about half of the whole) which must be sold whether or not; also the difficulty of preventing underselling.

The United States is the second largest silver producer in the world, producing about 27 per cent of the whole in 1925, as compared with the largest producer, Mexico, which yielded 38 per cent. It is somewhat curious then in the righteous and unrighteous scramble for mineral tariffs (along with other tariffs) that silver has not been so championed.

In accordance with the current theory of protecting by a tariff all American industries, a silver tariff would be logical, for silver is an important and widespread American industry: its use in the United States is largely for objects of luxury, which form a recognized legitimate means of taxation of those who can afford to buy. Among metal tariffs, therefore, its appeal is of the fairest.

But the fact that the United States has annually produced more than twice the amount of silver it has consumed, the rest seeking a market abroad, would of course make any tariff ineffective, unless the consumption could be greatly increased.

An Excursion Into Rouyn—I

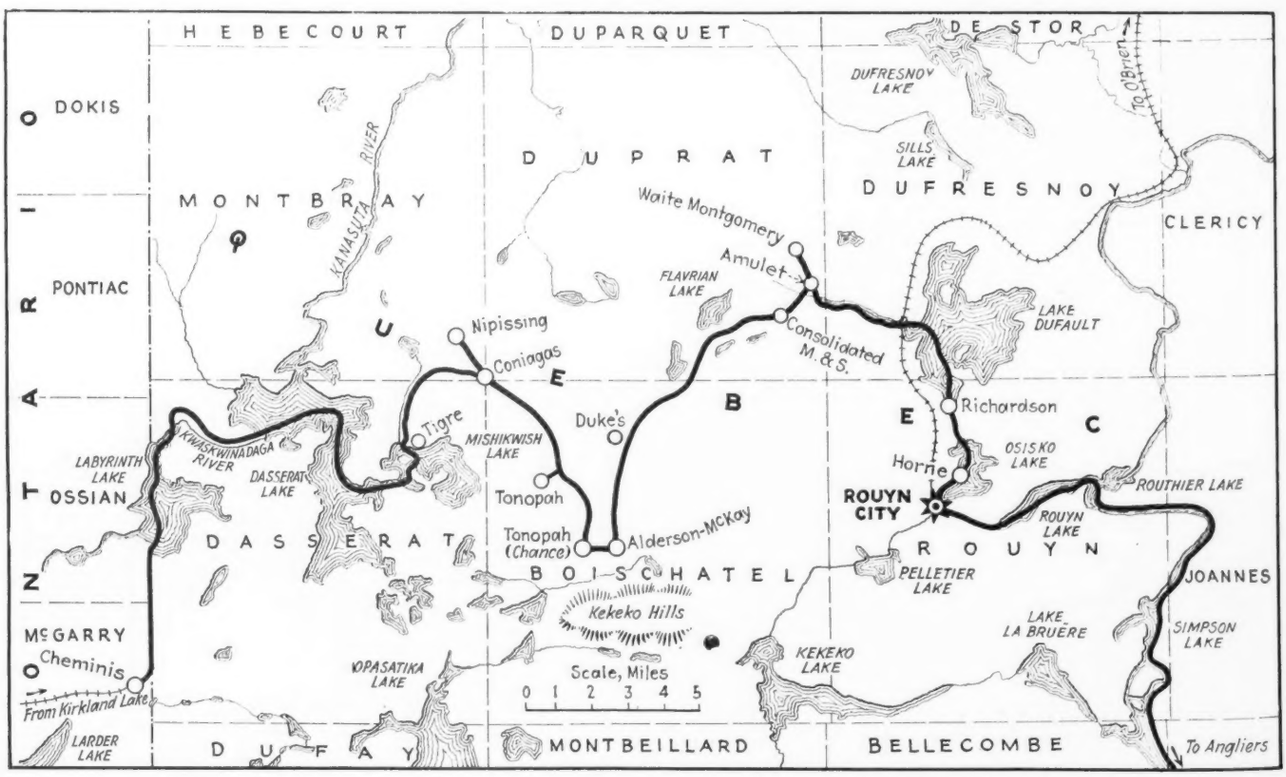
Scientific Prospecting Features Activity in Quebec's Copper-Gold Area—Noranda's Remarkable Horne Mine—Tramping Through the Bush

By Arthur Barrette Parsons
Assistant Editor

THE MOST EFFECTIVE ORDER in which to present a set of related phenomena, experienced showmen say, is: First, effect; then, cause. M. B. Huston, of Philadelphia, engineer in charge of exploration for the Tonopah Mining Co. of Nevada, may have had some such idea in his head when he advised me to travel through the bush eastward from Cheminis on the occasion of a recent visit to the Rouyn copper-gold area in northwestern Quebec. My plan had been to take the customary route from Haileybury to Rouyn "city," making the latter a base of operations for seeing some of the outlying properties. Mr. Huston gave his counsel on the more practical ground that I would see more, save time, and take advantage of the opportunity to get a good start with him and half a dozen others who were starting for the interior the next morning.

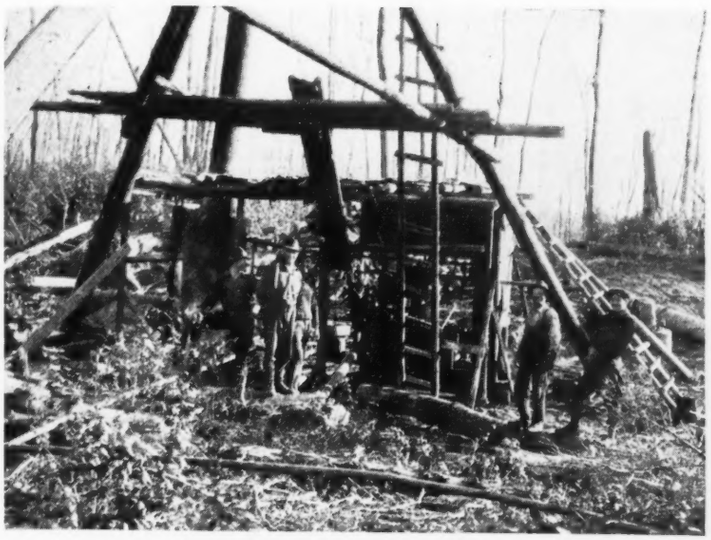
We had met by accident in Jimmy Ashe's widely, if not too well, known hotel in Kirkland Lake, on the evening of Sept. 10; and, pursuant to his directions, I made the journey as outlined on the accompanying map, traveling, in general, in the opposite direction from the course taken during the last two years by the copper boom. It began in Rouyn, spread westward over an area of 700 square miles, and at the moment is most rampant in Montbray Township. I began in the newer territory. I saw intensive and well-organized prospecting such as I believe has never been undertaken anywhere before. More about this later. I saw geologists systematically studying tracts containing thousands of acres of forest-covered terrain; I heard engineers enthuse over copper prospects that, though promising, did not impress me as warranting so much excitement. Keewatin lavas of andesite or rhyolite cut by diabase dikes, containing sulphides—pyrite, pyrrhotite, chalcopyrite, and sphalerite—sometimes massive, occasionally disseminated, but generally as filling in brecciated zones or "breaks"; this was the typical "showing."

I saw thousands of feet of deep trenching in hard rock and heard of thousands more. As I progressed eastward I saw some impressive outcrops of massive sulphides and heard of good-sized bodies of ore that had been proved by diamond drilling. But still I was in a quandary as to what it was all about. I saw railroad construction being rushed along southward from O'Brien on the National Railway; I saw the busy town of Rouyn, tripled in size in the past eight months, and I saw active preparations for building a 1,000-ton smelter by the



Map of the six most active townships in the Rouyn area. The heavy line indicates the route taken by the writer. In the key map, the shaded rectangle indicates the area covered by the main map.

Typical Scenes in the Rouyn Copper-Gold Area in Quebec



One of two diamond-drill outfits at the Tonopah company's Chance group. Driven by steam from wood-fired boilers.

Right — W. P. Murdoch, geologist, at the Chance, and some of his "husky" dogs. Left—A. B. Parsons, visitor at the Chance, in traveling costume.

Above — Camp of the Duke Syndicate, where there is not even a latch string to pull. See page 690. Right — A truly important person is W. J. Lanthier, chef for the "Consolidated."

The canoe is the universal means of transportation. This party has just crossed a portage from Labyrinth Lake.

Horne Copper Co., a subsidiary of Noranda Mines, Ltd. These were the visible effects. For five days I had canoed and walked, and at various camps had observed these things without being able fully to convince myself that many of these engineer-prospectors were not suffering from an over-injection of optimism.

Cause of the Activity

Finally, I went underground in the Horne mine: I saw the cause of all this ado. On the third level of the mine I walked 200 ft. along a drift in almost solid massive chalcopyrite, and for 75 ft. in several similar drifts or crosscuts at right angles to the first. The dimensions are not exact but they will serve. There are five major copper orebodies in the mine, not all of course solid chalcopyrite. Pyrrhotite is prominent in places, and pyrite less so. An average gold content of more than $5 per ton is by way of sweetening. After examining the third I went to the second and first levels. It was not difficult to see whence the inspiration comes for the vigorous and costly exploration and prospecting that is being done in the area to the west and north of Rouyn.

Left to right—Percy E. Hopkins, of the Victoria Syndicate, Frank Smith, and M. B. Huston, of the Tonopah Mining Co., at the railroad station at Cheminis.

At the Horne, rhyolite, andesite, and other lavas are cut by dikes of diabase and syenite porphyry; the orebodies are replacements in the form of lenticular masses with the longer axis vertical. No wonder a "showing" of sulphides similarly circumstanced geologically is given minute scrutiny! Another Horne, or even half a Horne, would pay for years of diligent prospecting; and that is the thought, whether they realize it or not, that lies uppermost in the minds of the men who are responsible for the expenditure of money in Quebec's copper-gold area. Naturally I knew beforehand that the Horne has large bodies of proven ore; but reading about rich ore is never so persuasive as the knocking off of pieces from the walls with your own pick. That is why seeing the Horne is a most satisfying climax to the long journey in.

Aside from marveling at the Horne orebody, the most significant impression that I brought away concerned the most remarkable demonstration of intensive, organized, scientific prospecting on a large scale that the world has ever seen. I do not believe this is an exaggeration.

Typical Sequence of Operations

To illustrate the nature of this work I will outline a typical sequence of operations for exploring and prospecting a group of forty claims containing 8,000 acres that are believed from a study of the regional geology to be favorably located. It must be realized that the country, particularly in the western townships on the map, is so heavily wooded with timber and thick underbrush that it is difficult to travel without the aid of axmen. Generally speaking, in Rouyn and Dufresnoy the forest, having been more recently burned over, is more open. The steps in order may be:

(a) Establishment of parallel base lines by transit surveying at intervals of a half mile.

(b) Running of "picket" lines at right angles to the base lines and at intervals of 200 ft.

(c) Geologizing of these picket lines by an experienced geologist who directs preliminary work with pick and shovel, and perhaps drill and dynamite, on some outcrops.

(d) Dip-needling of the picket lines at 50-ft. intervals by young engineers. The frequent presence of pyrrhotite and of magnetite makes this work significant. The "doodle-bug" notes, as they are called in the family up there, are plotted and the geologist studies the maps in connection with his own notes. Generally large areas can now be eliminated from consideration.

(e) A step that may be taken at this point is "electric" prospecting by the Lundberg or Schlumberger methods. This is being done on several large groups of claims where the preliminary geological and dip-needle work has been encouraging.

Difficult Country to Prospect

(f) Otherwise, the more favorable areas are selected for intensive prospecting. The survey is made more carefully, picket lines are established at 100-ft. intervals, and dip-needle readings may be taken at intervals of 25 or even 10 ft. The magnetometer may be used instead of the dip needle. Greater skill is required, perhaps, but the instrument is more sensitive and the resulting data are likely to be more informing. The fact that rock in place may be effectively concealed by only a few feet or even a few inches of detrital matter makes the country difficult to prospect without some instrument.

(g) Assuming that some areas still appear to be promising, they are cleared of timber and bush and active trenching is undertaken. This involves systematic work, with the generous use of hand drills and dynamite.

(h) If the "showing" thus opened is good, the next step is diamond drilling as the most economical and effective way to "see" under the surface. This is done on contract with wood-fired boilers and steam rigs.

(i) Shaft sinking and lateral development, with further diamond drilling from underground stations.

The foregoing sequence is of course only typical.

Town of Rouyn as seen from an airplane. Lake Osisko in the foreground. The Horne mine is at the right beyond the range of this photograph. The town has tripled in size in eight months.

Some of the steps may be omitted, or the order of their performance may be changed. The fact remains that hundreds of thousands of acres have been surveyed, picketed, geologized, and dip-needled. Systematic clearing, stripping, and trenching has been done on an unparalleled scale. When the comparatively difficult accessibility of the region and the covering of forest and brush are considered, it is easy to imagine that the process is expensive. Fortunately, a large number of interests with ample financial backing are conducting most of the work. An incomplete list of these includes:

Noranda Mines
Noah A. Timmins (Hollinger group)
Consolidated Mining & Smelting Co. of Canada
Tonopah Mining Co. of Nevada
Nipissing Mining Co.
Coniagas Mines Co.
Victoria Syndicate (Mond Nickel Co.)
Alderson-McKay
Waite-Connell-Bryce
Lucky Tiger-Combination
Porcupine Gold Fields Mining & Finance
Huronian Belt

Probably as good a way as any to convey an idea of the interesting activity in the area will be to give a "running" story (as the writers of sports columns would say) of my journey from Kirkland Lake to Rouyn and thence back to Haileybury, the residence suburb of Cobalt.

Besides Mr. Huston, the party with which I left Kirkland Lake included Frank Smith, field engineer for the Tonopah interests under Mr. Huston; R. H. Hutchinson, in charge of exploration in the area for the Coniagas Mines Co., who recently forsook a comfortable professorship to take up his new work; and Percy E. Hopkins, chief geologist for the Victoria Syndicate. Mr. Hopkins enjoys an excellent reputation in the North country by reason, among other things, of his long service as one of Willet G. Miller's efficient corps on the Provincial Geological Survey of Ontario. He, like Mr. Huston, was in reality only a sort of visitor in the woods.

THE RAILROAD TANGLE

The first leg of the journey is a thirty-mile ride on the extension of the T. & N. O. Railroad eastward beyond Kirkland Lake to Cheminis, near the provincial boundary. This railroad had as its objective the Horne mine; but the Quebec Government interposed legal obstacles in the way of construction that prevented the completion of the line. The Privy Council has since decided that the road may be finished; but, as the National Railways line south from O'Brien is virtually completed to Rouyn City, there is no particular rush to extend the line of the T. & N. O. Ultimately connection probably will be made with the O'Brien branch. The avowed purpose of the Quebec Government officials in obstructing the T. & N. O. project was to establish traffic channels through Quebec and to make Montreal and Quebec City the bases of operation for the mines of Quebec. To an extent at least they have been successful; but they have at the same time delayed the development of the region by about a year.

From Cheminis to Mosquito Landing, on Labyrinth Lake, is a five-mile walk along the Ontario-Quebec boundary. The landing is marked merely by a log cabin at the point where the clearing along the boundary meets the lake. Inquiry as to the reason for the name elicited the assurance that if I had been there two weeks earlier I would have required no explanation. In fact, unknowingly I had selected the best time in the year for my visit to the bush. The weather was not too cold for comfort; and yet the mosquitos and sundry other energetic and atrocious insects that the prospector lumps under the heading "flies" had disappeared. The beds, I found later, were all equipped with nets to make sleep possible during the summer. Those young engineers and geologists who are prospecting Rouyn are not on a picnic by any means.

Canoe vs. Burro

Another discovery that I made at this point cleared up a mystery that had puzzled me a little. I have often seen pictures of Ed Horne, prospector and original staker of the Horne claims, and always he had been in a canoe. I imagined the photographs had been taken on a week-end fishing trip, and I wondered why. Before I reached the Coniagas camp that night at 9 p.m., after twenty miles of canoeing interspersed with several portages, I knew that the canoe is to the Quebec prospector what the burro is to the "desert rat"—his only practicable means of transportation. By means of lakes and creeks and portages he can go almost anywhere, though the course may be roundabout. He can paddle faster than he can walk, and he can carry several hundred pounds of freight with him. Of late years the "kicker," a Johnson outboard motor operated with a small two-cylinder gasoline engine, has become very popular. It saves time as well as work. The Indian who met Mr. Hutchinson and me made nothing at all of carrying the 18-ft. freighter canoe on his head and shoulders. Incidentally we stopped for a few minutes at the camp of the Lucky Tiger-Combination Gold Mines Co. on Lake Mishikwish, where an engineer named Stewart is in charge.

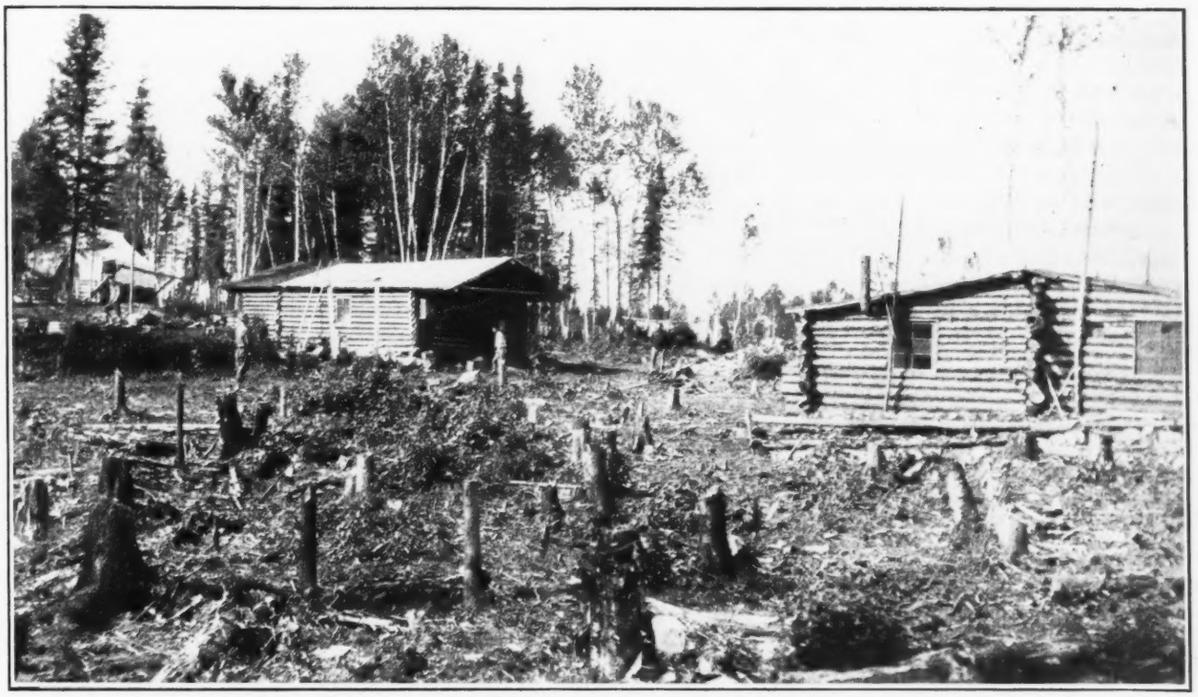
Philosophy of James Bartlett

The present Coniagas camp is a new one, the crew of thirty men having been moved from another further south only recently. It can be described quite fairly as "raw," and yet the men seem comfortable. James Bartlett, chief of the Coniagas exploration department, who was looking after things in the absence of Mr. Hutchinson, puts it this way: "Anybody can rough it; an intelligent man who isn't lazy can smooth the rough spots and be quite comfortable under almost any conditions." The cynic might be inclined to murmur that a little Christian Science helps out a lot. Outside of the kitchen, which is a log cabin, the quarters are all tents with under-structures of poles, made with varying degrees of elaboration. The men have small stoves and plenty of warm bedding; they can, if found desirable, spend the winter there without much elaboration in living arrangements.

My bed that night and the next consisted of a framework of spruce poles about 8 in. from the ground covered with balsam fir boughs and dried grass; one heavy double woolen blanket beneath and three of them above. Yes, the nights are cold already. One of the two men with whom I shared the tent removed only his shoes and mackinaw on retiring; the other fellow and I went a bit further. Thereafter during my stay in Rouyn I was in more mature camps — some more than a year old—and the supply of cots was better, albeit I was no more comfortable.

On Sunday I walked about two miles to the Nipissing Camp, where I saw the first of the copper showings under the chaperonage of Sam Hunter, the only strictly "practical" boss that I encountered during my week in the woods. He has a small mountain of rhyolitic rock containing various sulphides. A zone 30 or 40 ft. wide sprinkled with chalcopyrite has been trenched and cut

R. H. Hutchison (left), Joe Robinson, surveyor, and James Bartlett (right) in front of their headquarters at the Coniagas Camp. This small tent serves as both office and residence for Messrs. Hutchison and Bartlett



Camp of the Nipissing Mining Co. in Montbray Township. After the tent period come log cabins.

with four vertical diamond-drill holes. Ten other diamond-drill holes have been bored in search of the deposit in lower land and more were being drilled. Mr. Hunter understood that there was some gold in the ore, but he declared that he sent samples and drill cores to Cobalt and let the engineers worry about them! He was glad that he didn't know anything about the assays, because there was no danger of his spilling any beans.

The diamond drill was hauled in over the snow last winter by the contractor. He supplies his own water and fuel, feeds and houses his own men, six in number, and delivers core at $6.17 per foot, I understand.

On my return to the Coniagas Camp I found a number of new arrivals: Mr. Hopkins with his chief resident assistant, K. V. Heisey; and William Beaton, engineer for the Waite-Connell-Bryce group. He had come from Rouyn, a distance of 25 miles, a large part of which was over pretty rough trails; and he had carried a pack that must have weighed 100 lb. at least. Such jaunts are not for the mollycoddle.

Fate of the "Old-Time" Prospector

Bartlett, Hutchison, and Beaton are geologists from Queen's University, and Hopkins and Heisey are from Toronto University, so that I found myself that evening with a tent full of "scientific prospectors." Quite naturally the discussion turned to the fate of the so-called old-time prospector. Although there was some variety of opinion, I came to the conclusion that this honored, useful and picturesque individual, so far as he survived at all, had become a mere claim-staker. He merely locates claims in favorable territory in the expectation of turning them over under a bond and option to one of the exploration groups for actual prospecting. Small syndicates occasionally finance preliminary operations to the extent of doing the assessment work for the first year. On the other hand, the exploration companies have in many instances done their own staking: that is, they have had men on their payroll locate the claims, thereby entirely eliminating the individual prospector.

The man who really hunts for ore—which, essentially, is the job of the prospector—is the geologist. It is true that he reverses the old sequence; he stakes first and hunts second. He has the assistance of axmen, of surface strippers, of transit-men, of samplers and assayers, of dip-needle surveyors, magnetometer operators, "electric" prospectors; but he himself walks the picket lines, maps his geology, studies his assays, and interprets the findings of the dip-needle and the other instruments. These instruments are nothing but indicators; they supply certain evidence which is of value only when correctly understood and interpreted in the light of other evidence. That is the job of the geologist, and in the Quebec copper-gold area perhaps a hundred of them are doing a remarkable job of organized prospecting.

Most Orebodies Stumbled On

It is true that most of the orebodies proved thus far have been found by the old method of stumbling on them. One exception I shall mention presently. It may be found that this elaborate method of prospecting is too costly, that the results do not warrant the expenditure. That remains to be seen.

Local conditions—the cover of trees and brush, the mantle of earth covering the rock even on hillsides, and the magnetic quality of some of the minerals generally associated with the ore—make this particular area peculiarly suitable for the kind of prospecting that is being done. And yet one is bound to speculate on the possibility that these methods, modified to meet local conditions elsewhere, may be the prospecting methods of the future. Is the geologist the prospector of tomorrow?

The Coniagas activities are twofold. First, to prospect a large area in a preliminary way; and, second, to open further a good "showing" on which some work has been done. Two parallel mineralized breaks about 75 or 100 ft. apart intersect a third break at right angles. The presumed intersection, where it is hoped an orebody may exist, is in low ground, and considerable digging

or perhaps diamond drilling may be required to throw further light on the situation. Like the Nipissing, this could only be called a likely prospect when I saw it.

The next morning, with repeated stern admonitions to stick to the trail at any cost, I started alone with my pack of about 15 lb., including a kodak, for the Tonopah camps. I had a noon meal at a small camp where Gordon Bradshaw was making some dip-needle surveys, and pushed on to the Chance Camp, the scene of the principal operations of the Tonopah Mining Co. W. P. Murdoch, whose academic geological knowledge was absorbed at the Michigan College of Mines, was in charge here.

The Chance property consists of 1,200 acres, across which extend two mineralized zones striking approximately east and west. The country rocks, rhyolitic and andesitic volcanics, are intruded by dikes of diabase or gabbro, and a later syenite porphyry. The sulphides occur principally in a brecciated rhyolite, with occasional bunches of massive chalcopyrite. Systematic trenching has exposed No. 1 "showing" over an area about 300 by 600 ft.; No. 2 is exposed over a somewhat smaller area.

Diamond Drilling at the Chance

The present work consists of the operation of two diamond drills. The contractor, one must surmise, has no strong preference as to drills, for he has a Sullivan Class H2 working at a point about 300 ft. away from a Longyear U. G. machine. I understand that the Longyear is the more speedy, but that the monthly cost for operation, upkeep, and diamonds is more, so that the ultimate cost per foot is about the same with either drill under the conditions obtaining here. The drill holes are pointed so as to cut the supposed ore zones at depths of from 175 to 200 ft. The results will determine what the next step will be. Another good prospect with nothing definite proved to date.

Mr. Murdoch provided me with an eiderdown sleeping bag that night, and I can, with the utmost assurance, advise anyone who is going to camp up there—or anywhere else that is cold—to take one of these contrivances with him. I understand that the material is not really eiderdown, but it certainly combines warmth with light weight in marvelous fashion. Mr. Smith and Mr. Huston were in Montbray Township, where the Tonopah company has eight men trenching on a 2,000 acre group.

The First Proved Orebody

About 1½ miles to the east lies the Alderson-McKay property, of which 35 per cent is owned by the Towagmac Exploration Co. The other 65 per cent as well as an interest in the exploration company is owned by Noah A. Timmins, president of the Hollinger Consolidated Gold Mines, and easily the dominant figure in Ontario and Quebec mining. The property lies at the top of a high ridge, from which it is possible to see for a great distance in every direction. The camp, larger and built more with a view to permanence than any of the others I had seen up to that time, lies just above a small, picturesque, crater-like lake. Incidentally, at this stage of my journey I came to the first wagon road that I had encountered since leaving Mosquito Landing.

More important is the fact that here I saw the first evidence of a reasonably assured mine. There are three roughly parallel ore zones; I use the word ore advisedly. No. 1 has been trenched to show for about 60 ft. an 18 ft. orebody containing pyrite and chalcopyrite assaying 9 to 10 per cent copper with some gold. It is described as a replacement in andecite. No. 2 is 15 ft. wide and is exposed for 100 ft. on the apparent strike. The copper is more disseminated and assays range from 4 to 5 per cent. No. 3 is the principal orebody and the one on which work is being concentrated. It consists of massive sulphides including pyrrhotite, pyrite and chalcopyrite, some sphalerite, and occasionally galena, with a little granular quartz as the only gangue material. Gold is not important and the copper assays range from 3 to 13 per cent. One diamond-drill hole passed through 56 ft. of massive sulphides, according to K. W. Fritzsche, Queen's University graduate and resident engineer in charge of development. The replaced rock is a highly altered basic andesite cut by diabase and syenite porphyry dikes.

Sixteen diamond-drill holes from 200 to 400 ft. long have developed this orebody and a vertical two-compartment shaft is being sunk. The mine plant comprises a small steam hoist and two 120-cu.ft. Schramm compressors, each mounted on a portable frame with direct connection to a 4-cylinder Buda gasoline engine. I saw an identical compressor plant the next day at the Amulet property, and in each instance I heard a good word for it as prospecting equipment.

This orebody stands out as the one tangible product of scientific prospecting, to which I already have alluded. Last winter, when several feet of snow covered the surface, Mr. Fritzsche was engaged in a search for something bigger and better than Nos. 1 and 2, which standing by themselves did not amount to a great deal. He had obtained a few good dip-needle deflections in the area to the north, and consequently he undertook to make a detailed magnetic survey. Readings were taken at 10-ft. intervals on lines spaced 25 ft. apart. These were plotted and magnetic "contours" were drawn through points of equal deflection.

An Achievement for the "Doodle Bug"

I saw the map, and it looked much like a topographic map of an area containing a number of knolls. Some of the poles were centers of positive and some of negative deflection. Three points lying between poles of opposing character were selected as likely places to trench, and in each instance ore was opened! As all the dip-needle work was done on snow, the results astonished the men who manipulated the picks and shovels; in fact, they became imbued with too much confidence in the "doodle bug." That is one of the troubles with these devices. In the minds of the uninformed, a few high readings too often are interpreted as proving the location of an orebody. They prove nothing of the kind. The dip needle and any of the other instruments are useful only in the hands of engineers who know their limitations. At the same time, this is one body of ore the finding of which stands to the credit of the dip needle.

At noon that day after a tramp of seven miles I came to a small clearing and a cabin, on the unlocked door of which was tacked a weather-beaten paper announcing:

You Are Welcome
To Use
This Camp
But *Please*
Leave Things As You
Find Them and
Oblige
The Duke Syndicate

Among the things in the cabin were bunks and ample bedding; eggs, bacon, flour, coffee, macaroni, sugar, Klim (a powder that, mixed with water, makes a liquid that has the virtues of canned evaporated milk and in addition tastes like the product of the cow), smoking tobacco, books of various kinds, and large pictures of Mary Eaton and Constance Talmadge.

I made myself a cup of coffee, and if Mr. Duke should chance to read this, I want to thank him for the hospitality. If he ever comes to New York and will let me know I shall undertake to reciprocate. The importance of this little episode lies in the fact that it is typical of the spirit of the country. It makes no difference who or what he may be, the traveler who arrives at any of the many camps in this district is invited to eat, and to sleep if night is at hand. He may have to share a bed with someone else, but he gets one. No payment is asked, expected, or accepted. The farther humans are from civilization the more civilized they seem to act—or so it sometimes seems.

Left—Crew at the Alderson-McKay property, where underground development is in active progress. The cabin is the blacksmith shop.

Right — Clearing at the Alderson-McKay, showing trenches on Nos. 1 and 2 orebodies. Cutting the timber is one of the early steps in intensive prospecting.

MAKING FRIENDS WITH THE COOK

Though it scarcely appears so far on the map, the walk from the Chance to the camp of the Consolidated Mining & Smelting Co., in the eastern part of Duprat Township, is about 15 miles, which, over rough country, is not a bad walk for a tenderfoot. On my arrival there I found that the engineer, H. O. R. Dyer, McGill graduate, and sometime at the Sullivan mine in British Columbia, with virtually everyone else had gone to the "Bridge," 4 miles away, to vote at the Dominion election. It was on the occasion of Mr. Mackenzie King's victory over the conservative Mr. Meighen. Judging from what I saw and heard for a week before and after election day, I should say Canadians are more deeply interested in politics than most of us in the U.S.A.

W. J. Lanthier, chef, and I firmly believe (it is just possible that that 15-mile walk with only a cup of coffee on the way may have had something to do with this conviction) as good a cook as ever peeled a potato, acted as my host until Mr. Dyer returned. The showing is exposed by ten or twelve wide and deep trenches spaced 100 ft. apart. In one place the mineralized zone is 200 ft. wide. The chalcopyrite occurs in seams and fractures of the andesite rather than as massive sulphide. The trend of the formation is north-south and the dip is 30 or 40 deg. to the west. No diamond drilling has been done as yet, but it is likely that the coming winter may see one or more drills at work. This prospect is more advanced and looks more attractive than most of the properties where no actual ore is opened.

The Consolidated company has four other groups of claims ranging in area from 280 up to 2,400 acres. One of these is in each of the following townships: Duprat, Boischatel, Montbray, and Hebecourt. The last two are known as "winter-staking" groups. They are raw claims selected on the basis of regional geology, and staked by employees of the company. R. M. Macauley, who is in general charge of all exploration for the company, holds to the theory that the general vicinity of the major granite-andecite contact is favorable to copper deposition, and on this is based the selection of the location of several of the groups of claims. The diorite dikes, if and when pre-mineral, are believed to have served as impounding agencies for the metal-carrying media.

Note: In the concluding part of this article, to be published next week, will be described the journey to the Amulet, Waite-Montgomery and Horne properties, the three actually proven mines in the Rouyn area. The general situation will be discussed further.

Grinding Feldspar in Tennessee

Four Plants Produce One-third of the Total American Consumption

By D. F. Farrar
Chemist, Tennessee Geological Survey

D. F. Farrar

POTASH feldspar is used as an important constituent in the manufacture of pottery and enameled ware, tile, and glass. In the United States, during the last few years, there has been mined and ground for the trade from 150,000 to 160,000 tons of this material annually. Although found and mined in many places, one principal source of supply is the counties of Mitchell, Avery, and Yancey, along the western border of North Carolina. There the mineral occurs in great quantities in a pegmatite dike. It is mostly hand-picked as it is loaded into railroad cars for shipment about fifty miles to Erwin, in Tennessee. At Erwin are three grinding plants, and at Bristol, in the same state, there is one plant. These two growing industrial centers of eastern Tennessee possess excellent railroad facilities, as well as abundant supplies of water and electric power—three essential factors necessary to the establishment of any industry. To the district is to be credited about one-third of the supply of ground feldspar produced annually in the United States.

Close Sorting Gives High-Grade Product

As shipped to the grinding plants, the feldspar is in crystalline lumps of from 3 to 4 in. in diameter up to as large as a man can handle. Fig. 1 shows a large crystal that was photographed in the stockpile at one plant. This crystal is more than 2 ft. long, as can be seen by comparison with the railroad cross-tie standing vertically at the left-hand end. Three of the crystal faces can be clearly seen in the picture. Several other crystalline lumps were selected from various stockpiles; also, a sample was taken from one of the mills of the ground feldspar ready for shipment. This sample had been ground to pass 200 mesh. The analyses of these samples are, in percentages, as follows:

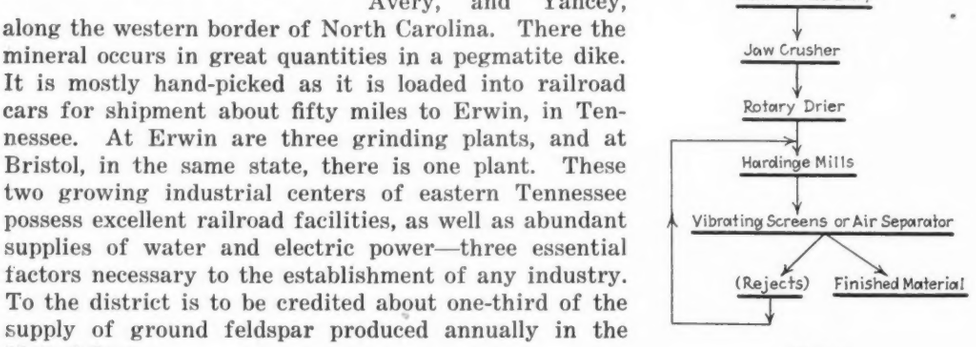


Fig. 1—This large crystal is more than 2 ft. long, as can be seen by comparison with the railroad tie at the left

Sample	A	B	C	D	On 200-mesh
Silica (SiO_2)	63.26	63.64	63.30	64.38	65.10
Alumina (Al_2O_3)	20.82	20.54	20.72	22.38	20.38
Potash (K_2O)	8.27	10.08	14.77	10.36	11.16
Soda (Na_2O)	6.10	4.80	.10	1.68	1.10
Lime (CaO)	.78	.66	.74	.84	1.96
Magnesia (MgO)	trace	trace	trace	trace	trace
Loss on ignition	.64	.46	.52	.40	.44

For comparison, the theoretical composition of pure orthoclase is: Silica, 64.7 per cent; alumina, 18.4 per cent; and potash, 16.9 per cent.

Fig. 2

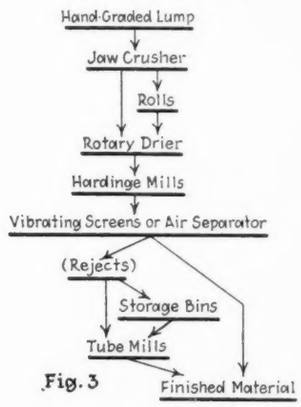


Fig. 3

Fig. 2—Typical flow sheet for continuous grinding.
Fig. 3—Typical flow sheet for batch grinding

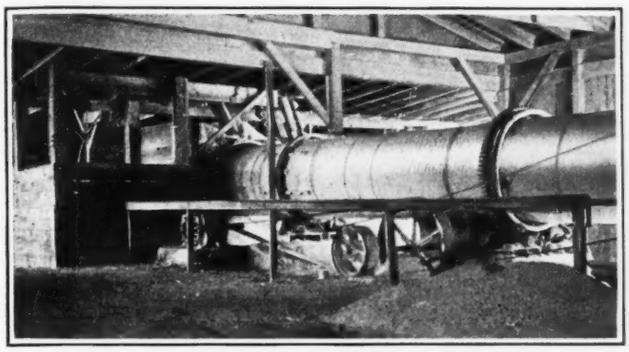
From these figures it is evident that the hand-picking of the lump rock, to free from quartz and other impurities, is well done.

One- or Two-Stage Grinding

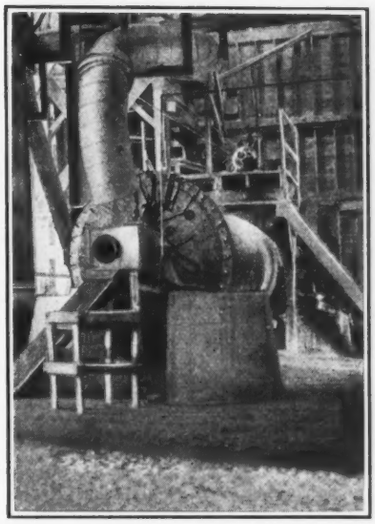
The four plants mentioned, which I have visited, use the same general methods of procedure in reducing the mineral to the required degree of fineness; namely, jaw crushers for preliminary crushing; then Hardinge mills, which were in some cases followed by tube mills. However, slight differences in detail, and in machinery used, may be noticed. All the grinding is conducted dry. As these plants are strategically located where hydro-electric power is abundant, the motive power used is electric.

The principal difference in the plants in regard to operation is the procedure for fine grinding. This divides them into two classes: (A) Those that have a continuous fine-grinding process, and (B) those that "batch grind" for the fine grinding. The accompanying flow sheets are typical of these.

Referring to Figs. 2 and 3 it will be seen that the lump rock is first passed through jaw crushers. One



Left, Fig. 4—Rotary drier, showing driving mechanism. Drying the crushed ore is necessary before fine grinding

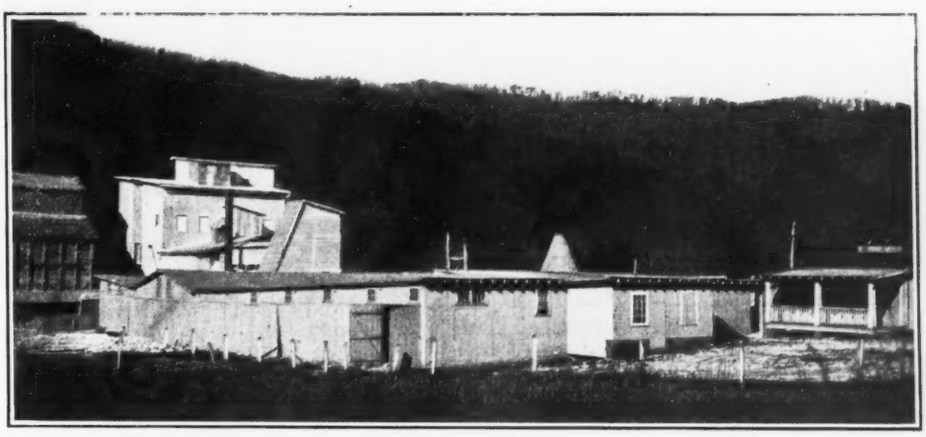


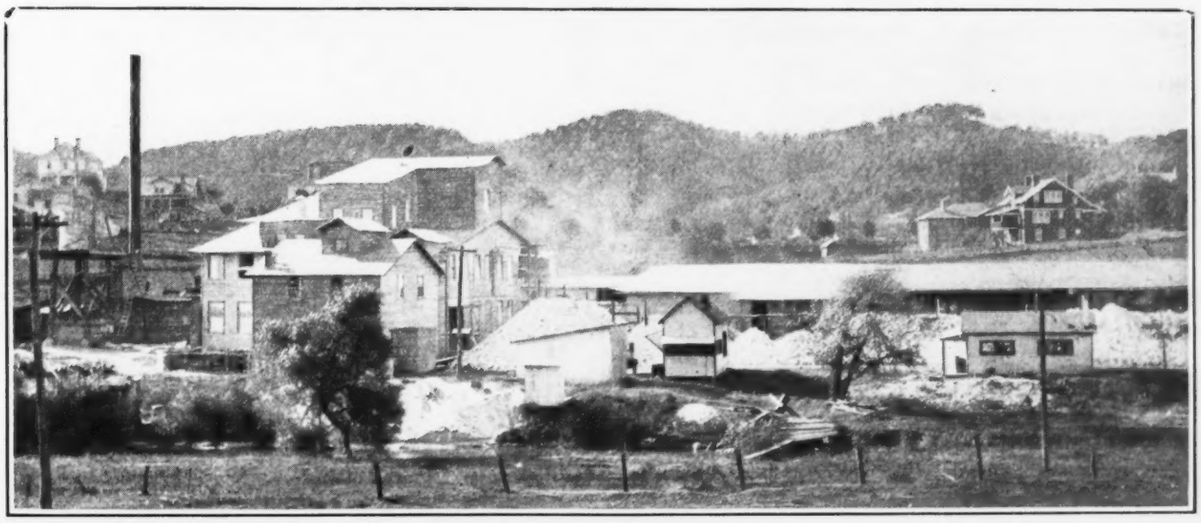
Above, Fig. 5—Tube mill. The large pipe is the connection to the separator into which the ground product is sucked for final sizing

Left, Fig. 6—Plant of the Erwin Feldspar Co., one of the oldest in the district

Right, Fig. 7—Golding & Sons plant at Erwin

Below, Fig. 8—Plant of the Tennessee Mineral Products Co. at Bristol. Note the stocks of sorted material ready for grinding





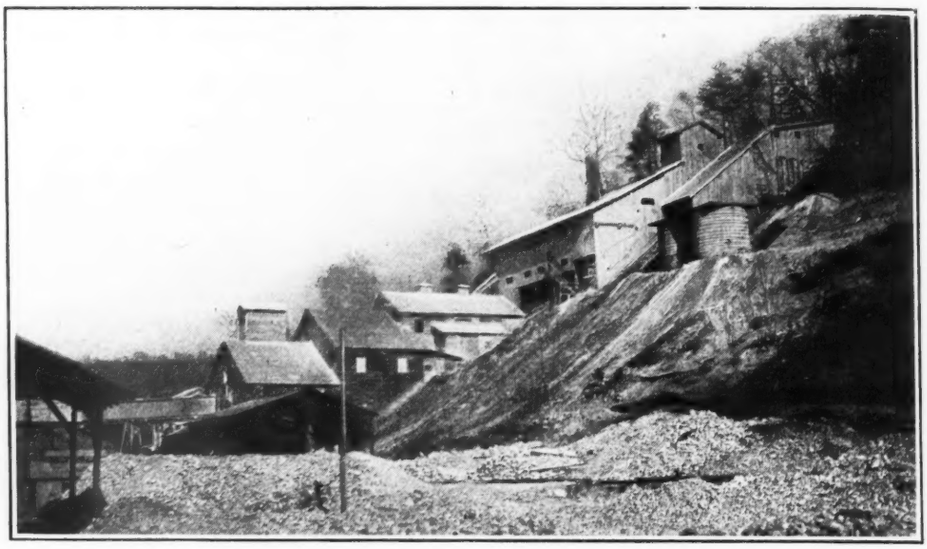


Fig. 9—The side-hill site is taken advantage of by the Clinchfield Products Co. in the erection of its grinding plant at Erwin

plant visited uses two jaw crushers, the first crushing the lumps to about 4-in. size, the stone going from there either to storage for later reclamation, or to the second jaw crusher, where it is crushed to about ½-in. size. In another plant, the material from the jaw crusher is passed between rolls, so set that sizes of ⅝ in. and finer are obtained. After this preliminary crushing, the material is passed through the drier, where traces of moisture are removed, a procedure necessary for fine grinding. The drying mechanism is a direct-heating rotary drier of the usual type, the source of heat being an oven or furnace built at one end, and using coal and coke for fuel.

This rotary drier and driving mechanism in another plant is shown in Fig. 4. In some plants, the raw material is elevated to the jaw crushers, which are placed at the high point of the mill, and the crushed rock conveyed through the processes mostly by gravity. This is usually done where the plant is located on the side of a hill.

Batch or Continuous Processes

The dry mineral, reduced to about ½-in. size and finer, is next passed through the Hardinge mills. These mills are in use at all the plants. They are usually fitted with link-belt type drive. From this point on, the process varies according to whether or not the method used for fine-grinding is continuous.

If the continuous process is used, the material from the Hardinge mill passes either to vibrating screens or to an air separator (of the Emerick or centrifugal type), and the oversize is returned to the feed end of the Hardinge mill, to again go through the cycle of grinding and separation.

If the batch-grinding process is used, the rejects from the vibrating screens or air separator, as the case may be, are transferred either to storage bins for later grinding, or directly to the tube mills, where the material is reduced to the desired degree of fineness.

Fig. 5 shows a tube mill and its connection to the air separator, the side of which is just visible on the left. In one case, vibrating screens in place of an air separator and two tube mills of the standard type, 6 by 24 ft., are used.

Ground feldspar is supplied to the trade in three degrees of fineness, these being 80 to 100-mesh, 140-mesh, and 200-mesh sizes. The glass manufacturers use the coarser sizes, 140 mesh is used in enamels, and the pottery trade requires the 200-mesh size. Though the several feldspar mills vary somewhat in size, the number of men employed at each one varies from eight to twenty, and the average capacity output of ground feldspar per plant is from 1,500 to 3,600 tons per month.

The four companies operating grinding plants in Tennessee are: Erwin Feldspar Co., Golding Sons Co., and Clinchfield Products Corporation, all of Erwin, and the Tennessee Mineral Products Co., of Bristol.

The mill of the Erwin Feldspar Co. is shown in Fig. 6. That of the Golding company is shown in Fig. 7, and the Clinchfield Products Corporation's mill is illustrated in Fig. 9. Fig. 8 is the mill of the Tennessee Mineral Products Co., of Bristol.

Progress in Crushing Machinery

In discussing crushing and grinding in the 1925 volume of "The Mineral Industry," Richards and Locke mention a new type of gyratory breaker known as the Newhouse, which is directly driven by a motor fastened to the top of the spider. The motor shaft has a flexible coupling and extends down through the vertical shaft of the breaker, and is splined into the bottom of the eccentric below. The entire machine is suspended from above by wire cables from the framework of the building, thus eliminating breaker foundations.

Continued progress has also been made by the new Symons cone crusher, which is a cross between a Symons vertical disk crusher and a gyratory. The National Lead Co. has purchased two 7-ft. mills of this type for its southeastern Missouri operations. The mill has a short central shaft with eccentric below like a gyratory, but the eccentric throw is 4 in. It also has the head on the shaft, but this head rests or floats in a large concave bearing support, resembling somewhat the convex support of the lower crushing member of the vertical disk type. The angle of the cone of the crushing head is about 90 deg., much greater than a gyratory and less than the disk, and consequently the path of the ore feed between the crushing jaws is radially outward and downward at a slope of about 45 deg. Mill speed is so high that a lump of feed cannot fall through by gravity. The crusher is designed for receiving feed at 3 or 3½ in. and reducing to ¼-in. Relief springs effect the elimination of all tramp iron.

The Kentucky-Illinois Ore-Magmatic District—I

By J. E. Spurr

ON BOTH SIDES of the Ohio River, not far above its junction with the Mississippi, lies the most important fluorspar region of the United States, and one of the most important of the world. Since the north side of the river at this point is the State of Illinois, and the south bank is the State of Kentucky, the deposits have been described by two state geological surveys; but they are a geological unity and cover a fairly restricted area, about 50 miles in extent in a northwesterly direction, and somewhat less (about 30 miles) in the northeasterly direction, at right angles (Fig. 1). The geology of the region has been elucidated by a number of investigators, and has in large part been mapped in some detail by Ulrich, Weller and others. Various reports have been written on the subject by members of the U. S. Geological Survey and by the Illinois and Kentucky Geological Surveys, and these furnish a wealth of valuable information and conclusions. Among these reports are those of S. F. Emmons (1892), E. O. Ulrich and W. S. Tangier Smith (1905), H. Foster Bain (1905), F. Julius Fohs (1907), Stuart Weller and L. W. Currier (1920), and L. W. Currier (1923).

The writer of this article accomplished a long-planned trip to this important and interesting field in April, 1926, and in this trip had the pleasure of the company of several geologists and mining engineers—R. C. Allen, H. A. Buehler, C. E. Siebenthal, John T. Fuller, and others; so that the trip was taken under favorable circumstances, which put to good use the few days that were available.

The reports which have been referred to have fully pointed out the fact that this district is peculiar not only for its fluorspar deposits—there are closely accompanying marked geological phenomena, highly localized in this district, and clearly diagnostic as to the origin and nature of the flourspar deposits. These phenomena are: 1. The occurrence at different points within the field of small basic dikes and sills—mica peridotite and pyroxene-lamprophyre. 2. The formation, in the Paleozoic strata which covers the district, of domed uplifts followed by a widespread system of faults.

The veins for the most part are true fissure veins, following some of these fault planes. These deposits have been interpreted by different geologists with the usual wide range of theories, varying from deposition of the fluorspar from descending meteoric waters to that of the introduction of the veins by magmatic solutions. My own casual inspection confirmed me in my anticipation that here was a typical magmatic ore province, and in this my conclusion followed largely the work of Bain, Fohs, and Currier. Ulrich and Tangier Smith (1905) believed that the fluorspar and other minerals were leached from the Paleozoic sedimentary rocks by rising thermal solutions. Bain (1905) decided that the veins were deposited from "heated ascending solutions," the mineral contents of which were precipitated by "descending cold waters." Fohs (1907) agreed with this interpretation. Currier (1920-1923) believed that the veins were due to "waters" from great depths which with decrease of temperature and pressure deposited veins "within the channels of circulation—namely, the fault zones."[1] On a later page[2] he concludes that the fissure veins are not due primarily to replacement but to "precipitation from supersaturated solutions," although replacement has played an important rôle. In an earlier publication[3] he had already argued strongly that thermo-aqueous solutions, which emanated directly from a large igneous intrusion, brought the vein materials.

My own views follow closely those of Currier and

Fig. 1—Map showing location of the Kentucky-Illinois fluorspar and peridotite field (1), together with the Central Kentucky fluorspar area (2), the location of the peridotites of Elliott County, Ky. (3); and of the peridotites of Saline and Gallatin counties, Ill. (4).

more closely indeed the unpublished views of Dr. R. C. Allen, of the Rosiclare Lead & Fluorspar Mining Co. (formerly State Geologist of Michigan). Dr. Allen wrote me on April 11, 1924: "The fault vein deposits of fluorspar and associated minerals in the Kentucky-Illinois district are in my opinion best explained by the application of your ideas concerning ore magmas." And he added a synopsis of his conclusions from a long study of the occurrences, observing, "It may interest you to know that these notes were dictated before I knew anything about your recent work and publications on ore magmas." Of the mineralizing solutions he observed that "they were, by common opinion, hot, uprising, concentrated liquid emanations from basic magma."

There is a general agreement as to the geological

[1] "Fluorspar Deposits of Kentucky;" 1923. Bulletin Kentucky Geological Survey, Series VI, Vol. 13, p. 19.

[2] *Op. cit.*, p. 59.

[3] Bulletin 41, Illinois Geological Survey, 1920, p. 279.

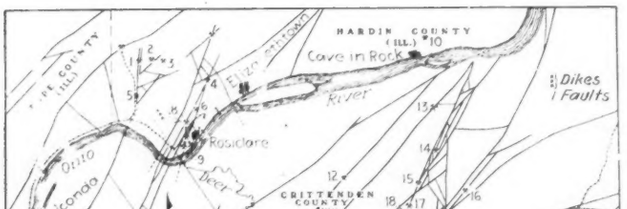


Fig. 2—Chief faults in Kentucky-Illinois fluorspar district

Based on a map accompanying an article by Albert H. Fay: "The Illinois-Kentucky Fluorspar Industry," Engineering and Mining Journal, July 31, 1926, p. 165

facts among the geologists who have contributed to the subject, so that the foundation for discussion is sound; and in presenting a summary of the conditions and the conclusion I acknowledge all of the above sources as well as information obtained by myself from engineers and geologists familiar with the district and from a brief period of personal observation.

The essential geologic history is as follows:

The flat-lying Paleozoic strata which are characteristic of the Mississippi Valley region were, at a certain definite period, locally pushed up into domical uplifts in this district, probably by an upward bulging of fluid basic magma in depth. This is especially marked in the northern part of the district, on the Illinois side of the Ohio River: De Wolf, then State Geologist, in introducing the report of Weller and Currier, says "the rocks have been bowed up in the form of an immense dome." But it is also in a general way true of the Kentucky area, as pointed out by Ulrich and Tangier Smith.[4]

As further evidence of the igneous cause of the doming, a number of narrow basic dikes appeared, scattered over the disturbed district. The dikes have mainly a northwesterly trend. Currier states that there are about twenty dike exposures on the Kentucky side of the river and ten on the Illinois side. Afterward the district was broken by numerous strong, narrow, and steeply dipping or vertical faults, mainly trending northeast, though many trend northwest. Currier estimates 150 to 175 distinct faults in the fluorspar region[5]. (Fig. 2). This faulting has been ascribed (particularly by Weller and Currier) to the collapse of the domical structures and the rest of the forcibly uplifted crust, and the usual adjustments made necessary by the consolidation of magma which has penetrated upward and undergone consolidation and shrinkage on the loss of its volatile constituents; and with this explanation I am in agreement. The faults early became the channels of access for the magmatic solutions which deposited the veins. These veins are of calcite with less fluorite and a certain quantity of galena and sphalerite; locally there is considerably barite.

It is agreed by observers and previous writers that there is in this district no relationship between the displacement and strength of the faults and the presence of strength of the fissure veins. Some of the fault planes carry veins; others do not. Bain concluded[6] that the veins are not frequently along major faults, and that it is a "common phenomenon" that an "orebody is found along a plane which seemingly marks very little displacement"; and Currier writes[7] of veins: "In most cases conditions point to only moderate displacement (100 to 500 ft.) along them." The Rosiclare vein, one of the most productive of the region, lies in a fault fissure which has a vertical displacement of 130 to 150 ft., while a long fault of 1,300 ft. vertical displacement, mapped in the near-by region, has no ore. Information which I obtained on my trip enables me to make a statement even a little stronger. The best veins, I was informed, occur on minor faults; and some veins where they run into large faults are cut off. Several veins which I visited in Kentucky are on small "auxiliary" faults parallel to and some yards away from main faults which are not known to be ore-bearing or which are known to be barren.

These are the complete characteristics of a typical magmatic ore-region, as I have defined them. Currier has already noted the application of my definitions to the fluorspar district, observing[8]:

"It is believed that the fluorine for the precipitation of the Kentucky-Illinois fluorspar bodies is a derivative of a deep-lying igneous mass, whose presence is indicated by the peridotite and lamprophyric dikes and sills of western Kentucky and southern Illinois. That fluorine existed in the magmatic source of these rocks is probably well indicated by the presence in them of unusual quantities of apatite and mica. . . . If an hypothesis of igneous origin for the veins is valid, the sequence of crustal disturbances attending the intrusion, differentiation, cooling, and mineralization appear entirely analogous with many mining regions where igneous forces have undoubtedly been responsible for the deposition of ores. An excellent and illuminating summation of such examples is given by J. E. Spurr.[9] Briefly the sequence is: 1, an upwarping of overlying strata by intrusion, with some fracturing and relatively little faulting; 2, intrusions (dikes and sills); 3, another period of fracturing, the faults being mostly of moderate displacements; 4, mineralization by ascending solutions during the last stage of consolidation of the magma; 5, more settling and faulting during the final shrinkage stages of the batholithic mass, continuing for a long time subsequent to the period of mineralization and consequently causing the fracturing and displacement of the veins as well as the formation of more profound faults which will be barren of mineral. The fact that the faults are of the normal rather than the reverse type suggests as their cause uplift and settling due to igneous intrusion and cooling rather than to orogenic causes."

The history of the Kentucky-Illinois district, to recapitulate, would then begin with the accumulation and bulging upward, in the crust beneath that now exposed, of a reservoir of basic magma, producing various domical uplifts and other disturbances. This magma surgence was followed by the usual adjustments as consolidation took place and faults developed. In the early stages of the fault adjustments, which were of long duration, the materials of the mineral veins were introduced, this mineralization period (although showing successive stages) being of relatively short duration. Subsequently faulting continued for a long while.

As to the age of these magmatic happenings, local data only show that it was post-Carboniferous. It was also probably Pre-Tertiary. Bain reports a water-worn

[4]Professional Paper 36, U. S. Geological Survey, 1905.

[5]"Fluorspar Deposits of Kentucky." 1925. Bulletin Kentucky Geological Survey, Vol. 13, p. 13.

[6]*Op. cit.*, p. 41.

[7]*Op. cit.*, p. 8.

[8]L. W. Currier: "Fluorspar Deposits of Kentucy;" 1923, pp. 82-83.

[9]J. E. Spurr: *Economic Geology*, Vol. XI, 1916, p. 601.

galena pebble in probably Tertiary gravels,[10] indicating long erosion previous to this Tertiary period. The faults are completely subdued by erosion: even reversed erosion fault scarps[11] have developed in many places. Dikes of peridotite and allied rocks, very similar to those of the fluorspar region, occupy a line reaching from Quebec to Arkansas; and in Arkansas such peridotites have been determined to be Cretaceous,[12] probably Upper Cretaceous.[13] It is believed by Branner, and by Miser and Ross, that the intrusion probably accompanied "the diastrophic movements that produced the down-warping of the Mississippi embayment early in Upper Cretaceous time."[14] The peridotite intrusions of Arkansas are cut by veins carrying barite. Ulrich states it as his opinion that the greater part of the fault movements took place during the latter half of the Cretaceous period, and that the dikes and the main faults were nearly contemporaneous, though the former had probably a brief priority.[15]

Let us next consider the nature and sequence of introduction of the magmatic solution. Such sequences are characteristic of ore-magma injections. The general order in this district was 1, Calcite; 2, Fluorite; 3, Galena and Blende. These are the three vein elements which are commonly found; and the sequence mentioned is that recorded by several previous writers, especially by Currier.[16] It is also the sequence which I observed clearly shown in several mines. Barite occurs only here and there, and will be discussed separately.

The veins are, as remarked above, definite filled fissure veins, and the chief filling is very coarsely crystalline calcite. This calcite has sharp contacts with the walls, whether they are of limestone, sandstone, or shale, and contains isolated angular inclusions of the same rocks, especially near the borders of the veins and to a less extent in the centers. The filling in of this calcite is not due to replacement: the idea of replacement of limestone by calcite is, of course, absurd. Neither has there been any noticeable recrystallization of the limestone, although some writers have described it in a very minor degree. The included fragments of limestone and other rocks are frequently quite isolated. as all members of our party agreed, and had no mutual support—pieces could be picked out, proving their isolation. There was no crustification observed, and previous observers confirm this. Yet this calcite occupies fissures often many feet wide. There is no evidence of deposition from circulating solutions, or of gradual building up; all the calcite crystallized simultaneously, and therefore from a standing or stagnant highly concentrated solution, of sufficient viscosity, at least in later stages, to support floating fragments of the wall rock. Fig. 3 is a sketch I made of a small calcite vein in the Haffau mine, in Kentucky, showing the splitting and shifting of a limestone slab in the calcite solution—a feature which shows drifting of fully supported fragments in this solution. These calcic solutions were injected at a single period; and the veins are therefore true veindikes. As to the source of the calcite, the lack of solution of the limestone shows that the limestones in which the veins lie did not supply the material. There is little or no wall rock alteration; except, as reported by some writers, a slight silicification (p. 698).

Magmatic calcite veindikes represent the closing stages in magmatic ore-injection series in many districts where basic and intermediate rocks occur.[17] In basic magma provinces, I have pointed out that magmatic calcite is indeed the characteristic gangue of veins, as quartz is in siliceous and intermediate magma provinces.[18] Analyses of the peridotite dikes in the fluorspar region show several per cent (one shows 9.46 per cent) of lime, so there is no doubt as to the magma having been able to supply it, and the likelihood is that it was magmatic.

Fluorite followed calcite, and largely formed by replacement of the earlier calcite and also (but to a very minor degree) of the limestone wall rock; in part, also, it was deposited in open fissures and cavities, usually of small size. The fluoric solutions were therefore, in their first stages, more fluid than the calcite solutions (magma). This is the relation described by Currier, and also that which I observed in the mines. The fluorite was deposited immediately after the calcite; there was probably some overlap, yet in most phases it is distinctly later. Certain calcite veins contain no fluorite. A case was reported to me by A. M. Shelby where a horizontal shifting (faulting) of a calcite vein developed a fracture, which became filled with later fluorite. In many places angular fragments of the calcite vein material are found supported by fluorite. I noted this, for example, in the Lafayette mine, in Kentucky; and here also I noted a fluorite vein 6 in. wide cutting squarely through limestone and calcite stringers.

The fluorite thus occurs as shoots or chimneys in the calcite veins, separated by portions (of the veins) which are low-grade or even barren as to fluorite. The irregular manner in which the fluorite has broken through and replaced calcite in general testifies to fairly penetrant

[10]Bull. 255, U. S. Geol. Surv., p. 26.
[11]J. E. Spurr, "Geology Applied to Mining," p. 116, second edition, 1926.
[12]Miser and Ross, *Economic Geology*, Vol. XVII, No. 8, Dec. 1922, p. 666.
[13]Miser and Ross, Bull. 735-I, U. S. Geological Survey, 1923, p. 312.
[14]*Economic Geology*, Vol. XVII, No. 8, p. 666.
[15]Professional Paper 36, U. S. Geogical Survey, p. 75.
[16]"Fluorspar Deposits of Kentucky," 1923, p. 83.
[17]"The Ore Magmas," Vol. II, p. 801.
[18]*Op.* cit., p. 625.

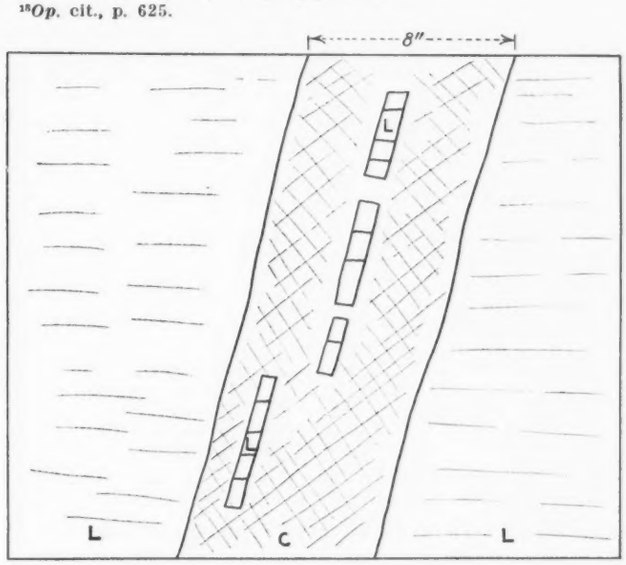


Fig. 3—Haffau mine, Mexico, Ky. Vertical cross-section of calcite veinlet, showing drifting of unsupported limestone fragments in calcite magma before consolidation

solutions in these cases. It seems very likely that the lime of the fluorite is in part at least the original lime of the replaced calcite, and that the carbon dioxide has been replaced by fluorine, making a more stable and insoluble compound. In one mine which I visited—the Haffau, in Kentucky—at 300 ft. in depth the principal fluorspar occurs in primary ore, in four shoots or chimneys, each 20 ft. or more along the strike of the main vein, at the intersection of the main (calcite) vein with incoming branches (feeders). In these shoots the material is 50 to 60 per cent fluorspar, while that between runs 10 to 20 per cent. In such a case, apparently, fluorine or fluoric compounds, entering along fissures which joined the already existing calcite vein, altered the calcite to fluorite, especially in the fields near the junctions.

On the other hand, evidence is that where open fissures were available fluorite filled them and passed through a liquid, concentrated, and even almost gelatinous stage before consolidating, and in these fissures at this stage the fluorite caught and supported angular and unreplaced fragments of calcite and of the wall rocks (whether limestone, sandstone, or shale), showing that the fluorite magma had then none of the normal high-replacing power which marked the earlier stages of fluoritization.

A very little quartz accompanies the fluorite, but in the large sense quartz is not a gangue material. According to Currier [19] the quartz is mostly later than the fluorite. However, the limestone wall rock of veins, and limestone fragments included in the veins, are in some places replaced in all degrees by quartz, forming jasperoid;[20] but this action is apparently quantitatively unimportant, and was not noticeable to the writer in his short visit. This association of fluorite and quartz, and the local penetration of the wall rock by disseminated quartz crystals, suggests the possibility that the original form of some of the fluorine was in a compound of fluorine and silica, but the vast excess of fluorite and the insignificance of quartz shows that the combination, if present, must have been a subordinate one.

Bituminous material, black and flaky, with an odor like petroleum, is reported by Currier and others as occurring here and there in the cavities of the fluorspar and of the calcite; some of the fluorspar, when freshly broken, gives off a strong odor of petroleum.[21] At the Beard mine, in Kentucky according to a statement made to me by A. M. Shelby, superintendent for the Franklin Fluorspar Co., drops of petroleum occur in the crystalline fluorspar; and in the Bonanza mine, in Kentucky, occasional pockets of oil were reported in the ore. I will discuss this later from a theoretical standpoint.

Sphalerite and galena, which occur in the same veins as the calcite and fluorite, were distinctly introduced along fractures later than the crystallization of both. This again is an overlapping crystallization; in some cases there is a certain amount of contemporaneous crystallization of sulphide and fluorite, though there is no contemporaneous crystallization of calcite and sulphides. Many of the fluorite ores mined produce a marketable amount of galena and blende as a byproduct. These two sulphides, and also pyrite and a little chalcopyrite, were apparently crystallized all at about the same time. It is reported by all the geologists that have studied the field that there is a concentration of sulphides where the veins adjoin or cross certain of the basic dikes. The most notable case is the Old Jim mine, in Kentucky, where the peridotite dike carries much iron sulphide, and zinc ore (blende, oxidized above to smithsonite) occurs along the contacts, replacing the limestone. Concerning this, Currier[22] says "Possibly circulating waters carried the zinc from major vein zones at the west, precipitating zinc sulphides where they met the dike material carrying the sulphide of iron. The fissures of access were the dike contacts." There is no calcite or fluorite here. It seems indeed to me likely that these basic dikes did effect a selective precipitation of the zinc sulphides from ore solutions, for since the zinc sulphides were the latest crystallization from the magmatic solution, and the dikes seem to have antedated all the phases of this crystallization and even the fissures which gave access to the ore solutions (ore magmas), these dikes could not have had any primary connection with the deposition of the sulphide ores. In the case of the Old Jim, fault-fissuring, later than the dike injection, was probably localized, as is so frequently the case, along the dike walls; and the subsequent zinc-bearing solutions were actively precipitated by the chemical effect of the basic dike material. The pyrite of the dike may have been formed at the same time by the effect of sulphurous gases accompanying the ore-solution introduction; and therefore these ore solutions may well have been the original magmatic solutions, from which the unusual precipitation of zinc-lead sulphides was due to the effect of the basic dike. I have observed a similar effect of basic dikes in precipitating copper sulphide (from descending waters in this case), at Ray, in Arizona. This precipitating effect at Ray seems to have been due to the dark silicates, not necessarily to pyrite. For another example of the selective precipitating effect of dark silicates in igneous rocks, see the case reported by Weed,[23] in this case the ore solutions being of magmatic origin.

According to Tangier Smith, blende has effected replacement of the limestone wall rocks more than any other vein material, being found in disseminated grains in the wall rock and in limestone fragments inclosed in the veins.[24] Nevertheless, there are no reported irregular or extensive replacements, away from the typical fissure veins, except in the case of the Old Jim mine.

Chalcopyrite is reported by the geologists I have quoted (especially Currier) as occurring, and as practically contemporaneous, with the galena and blende. Quantitatively, however, it is altogether insignificant, and may be left out of the picture. Silver occurs with the galena, in the Illinois part of the district, and in larger relative amounts than anywhere else in the Mississippi Valley, as has been pointed out by Bain and others. Concentrates of the Fairview company contained 7 to 8 ounces of silver with 75 to 80 per cent galena.[25] But in the Kentucky part of the area, Ulrich and Smith state that the galena "is practically nonargentiferous, as is generally the case with this mineral in the sedimentary rocks throughout the Mississippi Valley. So far as has been determined by analysis, the

[19] *Op. cit.*, p. 258.
[20] Tangier Smith: Professional Paper 36, U. S. Geological Survey, pp. 134-140.
[21] *Op. cit.*, pp. 254, 303.
[22] "Fluorspar Deposits of Kentucky," p. 26.
[23] "Geology Applied to Mining," 2d edition, 1926, p. 184.
[24] Professional Paper 36, U. S. Geological Survey, p. 137.
[25] Currier: *Op. cit.*, p. 49.

silver content of these ores appears to be no greater than that of the ores from the various lead districts of Missouri as a whole."[26]

The sulphides where I observed them in the mines as a component of calcite-fluorite veins are not only distinctly later than calcite, and, as a rule, than fluorite, but invariably show clean-cut channels of penetration into the older components of the vein. This is in distinction from the fluorite, which does this frequently but not usually. The concentrated sulphide solutions, accordingly, represented an independent phase of the residual ore magma.

Commenting upon the conclusion that these veins are, quantitatively considered, essentially veindikes of magmatic calcite, they fall in with a very definite type, as I have defined it.[27] Normally, wide fissure veins or veindikes of calcite represent the last and lowest-temperature magmatic stage in many mining districts. Concerning ore deposits in general, I observed:[28]

"Although they are individually different, it is because they are composites of numerous factors; but we shall find these factors as wonderfully uniform as are crystals of quartz, in whatever association we find them. The final calcitic veins at Tonopah, for example, at Matehuala, at Velardeña, or at Peñoles (where I shall presently describe them), and in dozens of other districts where I could list them, all over North America, are remarkably similar in every respect. They are a constant type recognized by the eye more easily even than by the mind, and eloquent of constant physical and chemical conditions, and consequently of fixed and immutable law, which functions independently of geographic locality."

The calcite veins or veindikes, like those of quartz, belong in what I have called, in summarizing the now generally accepted Zonal Theory, the zone of barren earthy gangues.[29] I have concluded that even these lowest-temperature representatives of the true ore magmas are injected while the rocks are still heated from the effects of igneous intrusion, possibly at around 300 deg. C.; below which point come the temperatures of the hot magmatic waters proper—the hot-spring temperatures.[30]

Dikes consisting of some 90 per cent calcite cut the altered basic igneous rocks of the Premier Diamond mine of South Africa. Recently they have been described by Daly,[31] who finds them puzzling, but regards them as "essentially magmatic," and says he "cannot accept either the replacement hypothesis or the 'vein' hypothesis for the great bulk of the vein material."[32]

In certain magmatic districts fluorite is closely associated with the magmatic calcite veins which I have described. Studying the Aspen mine, at Silverton, in Colorado, I decided that there fluorite and calcite were practically contemporaneous; both followed quartz veins carrying only a little sulphide ore, and these quartz veins in turn followed massive sulphide ores of galena and blende, and cupriferous pyrite.

Recognizing the calcite veins of the Kentucky-Illinois fluorspar district as belonging to the magmatic stage above indicated, the sequence (1) calcite, (2) fluorite, (3) lead-zinc (silver) sulphides is seen to be hardly harmonious, either with the general theory or with the Silverton, Colorado, instance cited above. And in this connection I quote again from "The Ore Magmas,"[33]

"In many vein sequences in mining districts which I have described, the latest of the magmatic vein stages has been calcite, which occurs characteristically in wide fissure veins. . . . Such veins are very common as the last stage; they are magmatic, for subsequent fissuring is uncemented, although in many cases old. In all these instances and many others, these calcite veins are the latest stage of the 'zone of barren-gangue veins,' as I have called them, which are later than the metalliferous veins. If, however, the normal order of vertical succession, due to decreasing temperature upward away from the focus of ore deposition, be reversed, and the temperature should rise subsequent to the formation of these calcite veins, then the metal-bearing siliceous ore-magma solutions will have their natural precipitation zone where before was the zone of calcite deposition."

The Kentucky-Illinois sequence, indeed, would suggest a rising temperature during the brief period of vein injection, so that the mobile fluorine or fluorides, and the lead-zinc sulphides, which also offer presumptive evidence of having been fluid and penetrant, could ascend into the upper zones already occupied by barren calcite, following, as a rule, the fissures which the calcite had already occupied and the minor openings caused by the shrinkage of the calcite on consolidation and other adjustment cracks. Yet the fact that there is no observed sequence between sphalerite and galena shows that consolidation took place not only by loss of temperature but by relief of pressure, and the presence of some silver tells the same story. The sulphides, indeed, represent to some very limited extent a "telescoped"[34] ore magma, and their small proportionate amount shows only a brief period of their ascension into a zone of relieved pressure represented by the mines now exploited. *To be concluded*

[26]Professional Paper 36, U. S. Geological Survey, p. 121.

[27]"The Ore Magmas," Chapter XVIII; "The Succession of the Earthy-Mineral Veins."

[28]*Op. cit.*, p. 813.

[29]*Economic Geology*, Vol. II, No. 8, Dec., 1907, pp. 781-795.

[30]"The Ore Magmas," Vol. II, p. 834.

[31]*Journal of Geology*, Vol. XXIII, No. 7, pp. 659-684, Oct.-Nov., 1925.

[32]*Op. cit.*, 684.

[33]*Op. cit.*, Vol. II, p. 695.

[34]"The Ore Magmas," Vol. I, p. 302, Vol. II, p. 557, *et. seq.*

Production of Iron in Canada Increases

Production of pig iron in Canada at 64,187 long tons in September was almost double the 34,609 tons in September of a year ago. The month's output showed a 9 per cent increase over the 58,780 tons of August, which in turn was 13 per cent under the 67,232 tons reported for July.

For the nine months ended with September the cumulative production of pig iron totaled 561,063 tons, compared with 372,960 tons in the corresponding period of last year. The increase was general in all grades, basic iron advancing 32 per cent to 371,803 tons, foundry iron 129 per cent to 149,252 tons, and malleable iron 63 per cent to 40,008 tons.

Furnace charges in September included 112,735 long tons of imported iron ore, 72,568 short tons of coke, and 34,421 short tons of limestone. For the nine months' period the furnace charges totaled 999,028 long tons of imported iron ore, 625,081 short tons of coke, and 304,552 short tons of limestone.

During the month one additional furnace was blown in at Sidney, N. S., resulting in six furnaces being in blast at the end of September. Of the active furnaces two were at each of the following points: Sidney, N. S.; Hamilton, Ont.; and Sault Ste. Marie, Ont. Active furnaces had a capacity of 2,325 long tons per day, or about 46 per cent of the total capacity of all blast furnaces in Canada.

Discussion

Banding Around Rock Fragments

THE EDITOR:

Sir—I was much interested in the article "Successive Banding Around Rock Fragments in Veins," which appeared in the *E. & M. J.* of Sept. 25.

Arguments were advanced to support the theory that the fragments were in a concentrated fluid, dense enough to hold them in stationary suspension. There would be some difference in the specific gravities of the fluid and the fragments, particularly after the latter began to grow. The hand specimen of cassiterite and pyrite from the Colorado vein, Chocaya (Fig. 12, p. 495), is an extreme example of this. Had the word "liquid" been used instead of "fluid," the accuracy of the deduction would be open to question on physical grounds. In other articles on this subject (vein filling), the use of "fluid" instead of "liquid" was defended on the ground that it might also contain gases or compounds (like water) ordinarily liquid but in these cases perhaps being above their critical temperatures. But there may still be room for criticism, for there is nothing in that distinction, so far as I know, that would affect the principle of physics involved.

I think it is correct to say that a solid will not remain stationary when completely immersed unsupported in a liquid, however dense or viscous, if there is a difference in specific gravity. It follows that such solids, given sufficient time, would either settle until they rested on something, or rise to the top. In this connection it might be pointed out that it is stated that the period of crystallization was relatively long in the case referred to.

The explanation given of the splitting up of the fragments is that it is a phenomenon similar to the "spalling" resulting from the immersion and isolation of a solid fragment in a hot fluid. A little further on are the following statements: " . . . this leisurely crystallization meant static, relatively high, temperature"; and that "this meant that the temperature of the wall rocks was the same as that of the ore magma when the ore magma was injected."

Now, I think the spalling of a rock fragment immersed in a hot liquid, as described (without chemical action), is a physical effect due to difference in temperature, and so cannot explain the "splitting" or "spalling" where there is no difference in temperature.

This may seem like haggling over unimportant details, but it is only by eliminating defective arguments and deductions that we can hope to arrive at the truth. At the same time any other suggestions that seem to fit any features of the case should be put forward.

What I have in mind is the ease, and sometimes perfection, with which crystals and crystalline aggregates build up in gouge. Often they are nodular or concretionary in form and show orbicular structure.

Movement along faults may sometimes be very slow and extend over long periods, with interruptions of varying duration. If crystalline aggregates were forming in the gougey mass between the walls of such a fault, they might well be caught between larger fragments during movement, and fractured. The stiffness of the mass might account for the newly formed fragments sometimes remaining in nearly the same relative positions, once the local pressure were removed.

The finely comminuted, gougey or near gougey material would be much more susceptible to chemical action than the massive walls and, it seems to me, might gradually be transformed into the gangue matter of a vein, without showing any appreciable alteration of the massive wall rocks. Fragments of wall rocks forming the nuclei of crystalline aggregates would be protected. Also, it is conceivable that the larger fragments, in other veins, where not so protected, might be so massive compared to the very fine particles that the latter would be completely changed without any appreciable alteration of the former.

The foregoing is put forward merely as another possible explanation of the formation of crystalline aggregates around apparently unsupported fragments of wall rock. It includes the formation of nodules and concretions with no visible nucleus of wall rock. The following are examples I have come across: mixed sulphides rich in silver; an instance of chalcocite carrying 10 per cent silver; and a specimen of cassiterite which I took out of a soft, crushed, and altered mass in a fissure in rhyolite. Most of us are familiar with the fine crystals of quartz, calcite and similar materials so often found in gouge.

C. B. E. DOUGLAS.

Cedral, San Luis Potosi, Mexico.

Tap Code for Miners

THE EDITOR:

Sir—In the news account of the imprisoned miners at Ironwood, Mich., as in the accounts of all mining disasters, emphasis is placed on the attempts of the imprisoned men to communicate by tapping on pipes or rock. Mention was made in the case of the men at Ironwood of use of the Morse code which, of course, is not practicable.

I would like to suggest that the following simple code might be taught to mining men through the mining journals and in connection with the courses in first-aid treatment. It has the advantage of being easily learned by any man that can read in any language and once learned cannot be forgotten.

The alphabet is divided into five sections. The letters in each section are numbered 1, 2, 3, 4, and 5, except in the last section in which they are numbered 1, 2, 3, 4, 5, and 6. Thus:

Section 1: A(1), B(2), C(3), D(4), E(5).
Section 2: F(1), G(2), H(3), I(4), J(5).
Section 3: K(1), L(2), M(3), N(4), O(5).
Section 4: P(1), Q(2), R(3), S(4), T(5).
Section 5: U(1), V(2), W(3), X(4), Y(5), Z(6).

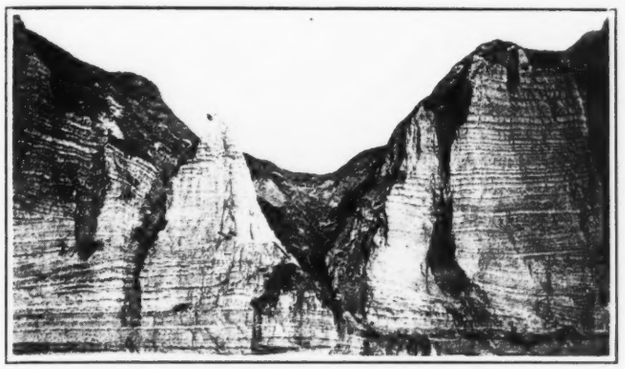
The message is spelled by rapping to indicate first the section number, and second, the letter, thus:

1–1 (A); 4–3 (R); 1–5 (E); 3–5 (O); 3–4 (N); 3–2 (L); 1–5 (E); 5–2 (V); 1–5 (E); 3–2 (L); 4–5 (T); 1–5

(E); 3-4 (N); 1-1 (A); 3-2 (L); 3-2 (L); 5-3 (W); 1-5 (E); 3-2 (L); 3-2 (L).

A short interval is allowed between the section number and the letter number, and a longer interval between the two sets of raps necessary for each letter. If this or any similar code is in use in mine rescue work I have never read of it. It is probably as simple and easily learned as any code could be, and printed in large letters and posted on the walls of the shaft houses, would soon become familiar to the men.

Chicago. O. L. HANSEN, M.D.



Chalk cliffs at Etretat, France

Chert in Chalk Cliffs

THE EDITOR:

Sir—I send you herewith a picture of the chalk cliffs near Etretat, France. The dark bands in the chalk are chert beds which are a replacement of the chalk. Examined closely these chert beds are found to consist of irregular masses connected together by smaller leaders, as potatoes are on their roots; and in many cases the connections, as well as the larger masses, are hollow. This shows that the silica was in the solution which passed through the channel. The quartz crystals that line the channel point inward; whereas they would point outward if the flints had grown from concretionary action of solutions from without.

Concretions are formed only within the belt of weathering, where material of various kinds is dissolved during periods of wet weather and concentrated towards centers of remaining moisture during dry weather. These chert or flint bands, which sometimes cut across the bedding planes as sheets or pipes, show by their hollow channels, which have not been completely filled, that they were deposited from solutions in a manner similar to ore deposits in general, and more particularly like the pipes and mantos of the Mexican lead mines recently described in the *E. & M. J.* Pebbles which contain silica in the form of opal are to be found, a greater number of which are of white or translucent quartz.

In order to test the theory of the deposition of these cherts or flints from magmatic solutions versus the concretionary theory, I took a sample of the pebbles on the beach at Etretat and had it assayed for gold. The assay certificate is inclosed and shows a trace of gold. When we consider that there are some thousands of square miles of France covered with chalk to an unknown depth, a large part of which contains these chert bands, it seems probable that prolonged search might show that some of it contains gold in quantities that could be worked at a profit. In any event a large tonnage of worthless material narrowly missed being ore. The manner of its deposition and the replacement of the chalk indicates that the solutions were alkaline with NaOH that had dissolved the silica, and also contained CO_2 which dissolved the chalk. The lime displaced the NaOH, causing the precipitation of the silica as chert in place of the chalk, which escaped in solution in the water and CO_2.

If these cherts were of concretionary origin they would be more abundant near the surface; but the pictures show that this is not so. This is another case where popular acceptance of a theory is no test of correctness. The solutions were of the same character and origin as those which converted sandstone into quartzite and the accident that they encountered chalk instead of sandstone resulted in the formation of cherts and flints instead of quartzite.

Paris, France. HIRAM W. HIXON.

Better Zinc Market News

THE EDITOR:

Sir—The enclosed clipping from the local Miami, Okla., newspaper expresses rather curtly a feeling for which there is some ground. The accounts of the zinc metal market in the daily metal papers and the Associated Press news in the daily newspapers have not always seemed as accurate as they should have been and have at times seemed to have been influenced by interested parties. I have stressed the word "daily" because your weekly paper is not included in this comment.

My own feeling about the subject has been that price rather than quantity, or rather than price plus quantity, has been shown. The United States Steel Corporation publishes monthly the tonnage of its orders. The New York Stock Exchange places as much emphasis upon the number of shares sold as upon the price per share. So should it be with zinc sales.

With the current zinc quotations over recent months we have seen the market quoted quiet or inactive when statistics later showed the actual volume of sales to be at record figures.

I am sure we should all be glad if you would take the trouble to throw more light upon this subject and perhaps point the way for better quoting methods.

Joplin, Mo. TEMPLE CHAPMAN.

The article in the clipping referred to, under the headline "Why Such Frequent Misrepresentation," follows:

"Attention has frequently been called in these columns to the unreliable reports sent out by some eastern metal papers concerning the lead and zinc markets, and the need of the mining industry of an eastern connection that will give facts—that will tell the truth about the movement of the two metals. Here is an illustration of the condition complained of: In the *Cleveland Daily Metal Trade* of recent date, under the heading 'Zinc Inactive, But Fairly Firm,' that paper said: 'Zinc was not very active during September. Lack of buying has been the chief factor in the market throughout the month.'

"That this was clearly a misrepresentation of facts is shown by the monthly statistics published in this issue. September was another record month in the zinc business, with shipments from smelters nearly equal to the month previous, which were the largest of any month in years.

"The question that concerns miners of zinc ore is, why this misrepresentation. Surely the eastern metal papers are in a position to give the facts, or if they are not, of what value are they to those who depend upon them for information? With few exceptions, the papers that are looked upon as authorities in matters concerning lead and zinc are worse than worthless, and they bear the mark of being the tools of interests that wish to deceive."

Consultation

Relocation of Mining Claims in Alaska

"Will you please answer the following questions in one of your issues? A mineral claim in Alaska, upon which no assessment had been done during the year of 1925, was relocated on the first day of July, 1926, at 12 o'clock by 'A.' Now, 'B' comes along and relocates the same claim on the second day of July, 1926, contending that the claim was not open for relocation until that time. Which of the two is right, 'A' or 'B'? Do you know of a court decision on a similar case?"

The claim was open for relocation immediately after 12 o'clock noon, July 1. Placer claims in Alaska are located and held by virtue of the following statutory enactments:

The act of March 2, 1907, 34 Stat. 1243, amended the laws governing labor or improvements upon mining claims in Alaska and expressly provided that upon failure of the owner of any claim to comply with the provisions of the act as to the performance of work and improvements, "such claim shall become forfeited and open to location by others as if no location of the same had ever been made." Under that legislation the courts have held that an owner in default cannot save his claim by the resumption of work prior to a relocation, the statute being in effect self-executing with respect to the forfeiture.

The mining laws were further modified and amended in their application to the Territory of Alaska as to placer claims by the act of Aug. 1, 1912 (37 Stat., 242). That act prescribed that on every placer claim located in Alaska not less than $100 worth of labor should be performed or improvements made "during each year, including the year of location, for each and every twenty acres or excess fraction thereof."

It has been held by the Secretary of the Interior that the forfeiture provision of the act of 1907 continues and applies to those placer claims located after the act of Aug. 1, 1912, equally as well as to those located prior thereto.

The act of Aug. 24, 1921 (42 Stat., 186), is entitled: An act changing the period for doing annual assessment work on unpatented mineral claims from the calendar year to the fiscal year beginning July 1 each. It is in form an amendment of Section 2 of the act of Jan. 22, 1880 (21 Stat., 61), and provides that the period within which the work required to be done annually on all unpatented mineral claims located since May 10, 1872, including such claims in the Territory of Alaska, shall commence at 12 o'clock meridian on the first day of July succeeding the date of location of such claim: Provided further, that on all such valid existing claims the annual period ending Dec. 31, 1921, shall continue to 12 o'clock meridian July 1, 1922.

Under this enactment the assessment period was changed from the calendar to the fiscal year and specified that the period should commence at 12 o'clock meridian of July 1 succeeding the date of location, so the first annual work must be performed prior to noon of July 1 succeeding the date of location.

Metallurgy of Antimony

"I should like some information regarding antimony metal. In what country is it mined and treated? Are there any antimony smelters in North America? Are there any textbooks on the subject?"

Practically all of the world's supply of this metal comes from China, where it is mined and smelted in native furnaces. There is also a small production from the district in which you are situated in Mexico, and also from Algeria, Australia, and Bolivia. Most of the smelters are in China, although we believe there is one in Australia and one or two in England. There was also formerly one there at Wadley.

Not a great deal has been published on the metallurgy of this metal. Possibly the most recent treatise is a chapter in "The Handbook of Non-Ferrous Metallurgy," by Liddell. Another article is a chapter of thirty pages in a French book entitled "Métallurgie des Métaux autres que le Fer," by E. Prost. There is also a chapter on this metal in each of the various annual volumes of "The Mineral Industry." These chapters give up-to-date information on the economics of the industry and also summarize recent advances in technology.

The Mercury Boiler

"What is the present status of the so-called mercury boiler?"

A boiler using mercury instead of water is installed at the Dutch Point station of the Hartford Electric Light & Power Co., Hartford, Conn. It is the development of W. L. R. Emmet, of the General Electric Co. The present boiler represents the fourteenth or fifteenth attempt of Mr. Emmet along this line, he having constructed successively a number of experimental boilers before installing the one at Hartford. This is the second mercury boiler and turbine to be installed there, the first having been torn down and rebuilt shortly after its installation. The present one has undergone a number of changes, and we understand that at present it is shut down with a view to changing over from oil to powdered fuel.

Leaching Lead Ore "in Place"

"I have read in *Engineering and Mining Journal* regarding the leaching of copper ore in place. Can you give me any advice or suggestions regarding the solution of lead ores, either cerussite or galena, in place? I have a very large vein about five miles long which has cerussite scattered through it the entire distance. The vein is broken and absolutely proven by drill holes and shafts to a depth of 400 ft. and would seem to be a good place from a physical standpoint to leach as the Ohio Copper Co. is doing in Utah."

So far as we know, lead is not being leached anywhere in the world. If any reader can tell us of experience with work of this character, *Engineering and Mining Journal* will be glad to publish any data that he may furnish.

News of the Week

The Mining News given in ENGINEERING AND MINING JOURNAL is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Summary

MEXICAN CHAMBER of Mines asks repeal of taxes on silver as offset to low price; gold exports must be balanced by imports.

Red Lake area mapped—First train to Rouyn, Quebec, Oct. 21 — American holdings in Ontario mining stocks decline—Lake Savant attracts prospectors.

Rand celebrates fortieth birthday — British Empire searches domains for tin — Rhodesian copper attracts attention.

Shotover dam (N. Z.) completed, but dredging operations somewhat disappointing.

Floods hamper operations at Nacozari, Sonora, Mexico.

Seneca producing 1,300 tons of ore per day — Cliff mine to be opened by Calumet & Hecla—Arcadian Consolidated opens new Baltic shaft, Nov. 1.

Old Colorado mines feature in sales and new production—Nevada Douglass refinanced—White Delf begins shipment.

Consolidated Mining increases zinc and lead capacity —B. C. Silver Mines completes surface plant.

Tonopah mines affected by drop in silver price— A. S. & R. adds 200 men at Garfield plant.

Central Copper's new plant in operation; second 500-ton unit planned.

Important Apex Litigation at Butte—Clark Interests vs. Anaconda

THE suit of the Moulton Mining Co., the Clark-Montana Realty Co., the Elm Orlu Mining Co. and J. Ross Clark against the Anaconda Copper Mining Co., one of the most important actions in the annals of mining litigation in the history of the Butte district, began at Butte Oct. 15, before Federal Judge George M. Bourquin, of the United States court for the District of Montana.

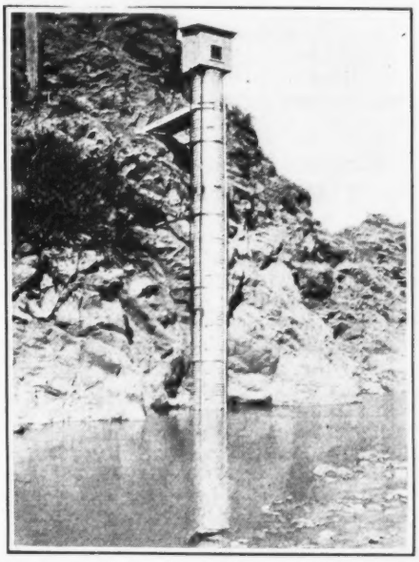
Ownership of valuable ore deposits lying beneath the surface of the Badger State group of claims of the Anaconda is the basis of the contest, it being alleged in the complaint that veins known as the Poser and Intermediate, apexing within the boundaries of the Poser claim, owned by the plaintiff Clark interests, dip extralaterally and southerly down and under the adjacent Anaconda's claims, with these claims subsequent in date of location to the Poser. An accounting for ore mined and an order against further alleged trespass of the deposits in controversy are sought by plaintiffs. The complaint sets forth that the defendant has carried on mining operations on the 2,600 and 2,800 levels in the extralateral extensions of the Poser and intermediate veins.

The Anaconda Copper Mining Co. in its reply to the complaint entered a general denial of the specific points at issue and in its pleading set up as a defense and bar to prosecution of the suit the statute of limitations.

The substance of the answer is that the Poser and the Intermediate lodes have no existence in fact and are not therefore being exploited by the defendant.

The question of ownership of the alleged orebodies, says plaintiff, has been under discussion since 1923. Plaintiff and defendant in that year entered into a stipulation to delay suit for seven months. At the expiration of this period, a further stipulation for a period of thirteen months was entered into. These stipulations were to protect plaintiff's rights against the statute of limitations.

The suit, after nearly two weeks of evidence taking, is attracting much attention on account of the complex geological conditions brought out by expert witnesses.



Government gaging station on the Gila River, San Carlos, Ariz.

Butte & Superior Encounters Copper Ore in Rainbow Lode on 3,400 Level

The Butte & Superior Mining Co., Butte, Mont., has opened in a crosscut on the 3,400 level, the deepest in the mine, a body of copper ore 17 ft. wide. This ore is in the Rainbow lode and is the first copper ore cut in Butte & Superior ground in the Rainbow lode proper that has been of commercial promise. The find was not unexpected, as the orebody was indicated by developments on levels above, but on the upper levels the ore carried zinc instead of copper. The silver remains unchanged. Its grade in copper is about the same as in the copper ore at the west end of the property, which occurs in an entirely different system of veins. The new orebody has been cut only in one place as yet, and though it is a favorable development it is not an unusual nor an unexpected one. It will take some time to open this new ore up sufficiently to form any real opinion as to its ultimate value. All that is known is that the new ore is about in the position that was anticipated from developments on levels above, where it has always carried zinc and silver but practically no copper. On the lower level it carries copper and silver but practically no zinc.

The shaft was completed to its present depth only about two months ago, when this crosscut, the only working on the level as yet, was started for the Rainbow lode, the main ore carrier of the property. It will be some time before the copper ore on the west end of the property can be opened on the 3,400 level.

Government Advertising for Bids on San Carlos Dam

The Department of the Interior has advertised for bids for the construction of the dam for the San Carlos irrigation project in Arizona. Congress has authorized the construction at a cost not to exceed $5,500,000. Water stored by this dam will be used to irrigate 100,000 acres in the vicinity of Florence and Casa Grande, Ariz. About half of this acreage is owned by Pima Indians. The dam was designed by Major C. R. Oldberg, engineer of the Indian Service. A lake five miles wide and 20 miles long will be created. It will submerge the town of San Carlos to a depth of 100 feet.

Duplex to Build 30-Ton Mill

The Duplex Mining Co., of which William Schierding, of Spokane, is manager, will equip its Z Canyon mine, 14 miles north of Metaline Falls, Wash., with a 30-ton mill consisting of crusher, ball mill, and tables. Flotation may be added. Two carloads shipped recently showed that the ore would not stand the cost of freight. The ore carries about 10 per cent lead, 5 per cent zinc, and half an ounce of silver.

Copper King Mine in Hillside District Unwatered

The Copper King mine, about 35 miles west of Hillside, Ariz., on the line of the Santa Fe Railroad between Phoenix and Prescott, is being actively worked on four levels, and the water on the 600 level is sufficiently under control to permit immediate developments. The Copper King is a zinc property with possible prospects of copper in depths. The property is being developed by the World Exploration Co., of Forth Worth, Tex.

Lake Savant Attracts Prospectors

According to a report from Winnipeg, a rush of prospectors is in progress to Lake Savant, following reports of recent gold finds in that area, and within the last few days at least fifty prospectors arrived north of Bucke Station, on the Canadian National 300 miles east of Winnipeg. Though this places the new gold field about seventy miles further east than Hudson, the close proximity of the prospecting area to the railroad would appear to give the Lake Savant area a slight advantage.

Cliff Mine to Be Reopened by Calumet & Hecla

Reopening of the old Cliff mine, in Keweenaw County, Mich., by Calumet & Hecla Consolidated is designed to investigate veins which may be reached through a vertical shaft sunk many years ago in the Cliff fissure. Heretofore, with two exceptions, diamond drilling has been the chief means of exploring regular lodes in the property. Cliff has been extensively diamond drilled, but only the actual opening of veins is satisfactory and conclusive. In addition to the Kearsarge, Cliff carries numerous other amygdaloidal beds. The old Cliff shaft to be reopened is in good condition and will require only pumping and minor repairs to put it in readiness. The old Keweenaw Central railroad extends to the Cliff property.

Assay Office at Sault Ste. Marie An Aid to Miners

The assay office established at Sault Ste. Marie, Ontario, by the Algoma Central Ry., is proving a great convenience to prospectors and mining men. Under the supervision of George W. McLeod, consulting mining engineer, a thoroughly modern plant has been installed, which is much appreciated by those mining companies which have no assay offices of their own.

Arcadian Consolidated to Open New Baltic Shaft Nov. 1

At Arcadian Consolidated, Houghton, Mich., operations probably will be resumed at the New Baltic shaft Nov. 1. The engine and compressor house has been completed and installation of the surface plant is under way. The present surface plant, which was removed from New Arcadian shaft, replaces one destroyed by fire several years ago. The shaft will be sunk to greater depth.

Porter-Idaho Begins Shipment

The Porter-Idaho Mining Co., which for the last three seasons has been developing a silver-gold-lead deposit on the north fork of the Marmot River, in the Portland Canal mining division of British Columbia, has opened a shoot of high-grade ore and is shipping at the rate of about 20 tons per week to the Trail smelter. The first 43 tons brought a return of $265 per ton, after freight and treatment charges had been paid. The ore has to be sent down the mountain by pack horses.

Site of proposed San Carlos dam on the Gila River, Arizona

Georgia Talc Resumes Operation

The Georgia Talc Co., Asheville, N. C., which closed its plant at Marshall, N. C., two years ago, resumed work last week. Its mine on Big Laurel will be reopened in a few days. The company is engaged in the manufacture of soapstone pencils and smaller articles. Raw soapstone is secured from the mine on Big Laurel and other small mines in various parts of Madison County. The company formerly operated two plants at Marshall.

Reorganization of Abana Mines, Ltd., Delayed by Injunction

The plan for the reorganization of the Abana Mines, Ltd., Rouyn, Quebec, is meeting with strong opposition from a number of the shareholders. Three interlocutory injunctions, the first directed against the Abana Mines, Ltd.; the other two against the Abana Mines, Ltd., the Sun Trust Co., Ltd., and J. C. Lamothe, have been issued by the Montreal Supreme Court. The injunctions were issued on behalf of the shareholders for the purpose of opposing a resolution by which the interests of the Abana Mines, Ltd., would be transferred to a new company to be formed, the old shareholders to take stock in the new company in payment of the holdings.

Smithers Property Changes Ownership

The principal recent development in the Smithers, British Columbia, district has been the taking over and commencement of work on the Babine Range properties by Henry L. Messner, of New York, and associates. High-grade ore is now being brought out to Smithers on pack horses from the Little Joe and Babine Silver King properties. A 30-day option has been taken on the Richfield Mine, at Topley, for A. B. Trites, Vancouver, B. C.

A. S. & R. Add 200 Men at Garfield

The American Smelting & Refining Co. recently put on 200 additional men at its Garfield smelter. Officials of the company are said to have declared that increased business in Utah demanded that the smelter be worked at capacity. If receipts of ore continue to grow, it may be necessary to add other units.

Reindeer Industry Growing in Alaska

The reindeer industry in Alaska promises to become an important factor in the future development of the Territory, says the Biological Survey of the United States Department of Agriculture. From the original stock of 1,280 animals imported from Siberia over a period of ten years up to 1902, the reindeer in Alaska have now increased to about 350,000 animals, distributed in 110 herds.

In addition to the numbers in present herds, it is estimated that about 125,000 have been killed for food and clothing.

Tonopah Mines Affected by Recent Silver Price

Bullion shipments from the Tonopah (Nevada) silver mining district totaled $157,300 in value for September. This is about normal for recent months. Tonopah Mining and Tonopah Belmont production amounted to $42,300, that of Tonopah Extension $42,000, and West End $29,000.

The present decreasing price of silver is a serious blow to the Tonopah district, as it practically wipes out profits for the most of the companies. The Tonopah Mining Co. is reported to be shipping a grade of ore which will not be seriously affected by the drop in silver, but the other main producing companies are undoubtedly running on a close margin. Tonopah Extension continues to operate at a large loss, but reports from the property indicate improved mine conditions, with possibility of breaking even within a few months.

Consolidated Mining Increases Zinc and Lead Capacity

The Consolidated Mining & Smelting Co. of Canada has started work on the construction of a new 80-ton per day unit to the zinc department at the Trail smelter. When completed this will bring the rated capacity of the zinc department up to 280 tons of fine zinc per day. It is expected that the new 50-ton per day addition to the lead department, which was started early in the summer, will be put into operation before the end of October. The company also is doubling the capacity of its custom concentrator at Trail. The milling service, which was started more than a year ago, has met with such general approval from mine owners in the Kootenays and beyond that for some time past more ore has been received than the mill was able to handle.

B. C. Silver Mines Completes Surface Plant

B. C. Silver Mines, Stewart, B. C., has built a 60,000-gal. fuel-oil tank, a change house, an assay office, a central heating plant to heat all the buildings in the camp, and an addition to the offices. The company contemplates no further surface construction during the development stages of the property. Several oreshoots which have been developed on the upper levels will be developed on No. 4 level also.

Washington News

By Paul Wooton

Special Correspondent

Mineral Production in 1926 Surpassing Previous Years—Transportation Studies Essential

Statisticians at the U. S. Bureau of Mines believe that production of minerals during 1926 will reach an impressive total. They are not ready yet to make any formal estimates, but from knowledge of the general situation expect the record of the year to be a very satisfactory one, in so far as volume of output is concerned.

Though the big increases will be in some of the non-metal building materials, production of coal, petroleum, iron ore, copper, lead, and zinc have been at a sufficiently high rate to assure a particularly good showing for the year now drawing to a close. Account is being taken of the probability of a heavy coal production during the last two months of the year. Even the output of precious metals and the rarer minerals is exceeding earlier estimates. The fall in the price of silver is not expected to begin to affect production of that metal until after the end of the year.

The Bureau has practically completed its statistical work on the minerals produced in 1925. Owing to the time required to get material of this character through the Government Printing Office, only a few of the 1925 reports are available as yet. Abstracts of each report, however, have been issued in mimeograph form and distributed to the press.

It is confidently expected that Congress at its next session will vote enough additional funds to the Bureau to allow it to augment its economic work. If additional funds should be made available it is planned to employ specialists of standing to pursue current marketing, transportation, and price studies. In addition, it is hoped that additional commodity specialists can be retained.

Transportation Problems

It is believed that great service can be done the mining industries by transportation studies. Transportation is the limiting factor in the distribution of bulky commodities. Secretary Hoover believes the inland waterways can be used to advantage in reducing transportation costs on such freight. This is particularly the case with the last of the dams in the Ohio River which will be finished in the near future. This will open a great fluvial highway through one of the nation's greatest industrial regions. Practically all railroads now make joint rates with water carriers which enable most shippers to get some advantage of the lower water rates. Barge lines have been providing regular service on the Mississippi and Warrior Rivers for a number of years. The success which has attended these operations is encouraging plans for the establishment of such service on other streams. This is likely to widen the radius of distribution of many bulky commodities.

Central Copper Will Construct Second 500-Ton Unit

Central Copper Co.'s new 500-ton mill was started on Sept. 28, and at the same time production was started at the Elma and Consolidated mines. The properties are at Dos Cabezas, Ariz. Mill tests indicate that a seven to one reduction will be made, giving a concentrate containing from 22 to 24 per cent copper and $7 in gold and silver. The 500-ton mill just completed is the first unit of a set of four. The second unit is to be started within six months. At the Elma mine the ore is crushed to 2½ in. size, and transported by aërial tramway 8,000 ft. long over a mountain of 7,200 ft. elevation to the head of the Consolidated tramway. The ore from both mines is carried from the Consolidated to the roll crushing plant by a 10,000-ft. tramway. At the latter point the ore is crushed to ½ in. size and conveyed to the mill bins by a 360-ft. belt conveyor. The flotation equipment consists of two 10-cell Minerals Separation roughers and two 6-cell cleaners.

The company's annual report shows that the million dollar indebtedness of the previous year has been wiped out, that over a million dollars has been spent on new equipment, construction work and development, and that there is a cash balance of about two and one-half million dollars on hand.

U.V.X. Secures Control of Bisbee Queen

The United Verde Extension Co. owns or has options on seventy-one per cent of stock of Bisbee Queen Development Co., Bisbee, Ariz. A new company will be formed, capitalized at $750,000, and about $200,000 will be spent in exploration of the property, which consists of sixteen claims or three hundred thirteen acres in Gold Gulch, Warren district, Arizona. The adjoining Lone Star shaft is seven hundred feet deep. Exploration work will start at once under the direction of M. J. Elsing, consulting engineer.

Seneca Mining 1,300 Tons per Day

The Seneca copper mine, near Mohawk, Mich., has brought production up to 1,300 tons of copper rock per day, an increase of 200. Yield is averaging about 22 lb. of refined copper per ton.

In connection with the reopening of the old Cliff property, in Keweenaw County, Mich., the Ashbed formation which extends through Cliff, Phoenix, Arnold, and Ashbed territory is believed to hold profitable values. This bed has never been extensively opened, having been tapped only here and there by shallow pits or diamond drills. Present-day methods and definite geological data hold out the promise of successful development.

Production of Copper Range near Houghton, Mich., will show a little increase for October. More men have been taken on underground in the last few weeks and tonnage from the Trimountain branch, now on a profitable basis, is coming up gradually. The flow of water into No. 4 shaft, Champion, is being successfully handled.

First Train to Rouyn

Trains are now being run to Rouyn, Quebec, over the branch line of the Canadian National Railways, the first train carrying 75 passengers arriving on Oct. 21. Along the right of way the telephone and telegraph lines are being erected, with poles in and wires strung over the first half of the route. Foundations have been completed for a number of stations along the line.

Old Colorado Mines Feature in Sales and New Production

The Mill Creek Mining Co., Colorado Springs, Colo., has acquired the five mining claims recently operated by the Telescope Mining & Milling Co. of Durango. The claims, on Telescope mountain, are near the Silver Ledge group and have produced some ore from surface workings. During prior operations considerable development was done; but ores encountered at that time contained too much zinc to be of value.

The United States Vanadium Co.'s vanadium mine near Rifle, Colo., which has been undergoing extensive improvement, will be ready for operation about Nov. 10. It is reported that the plant for the treating of the vanadium ore will have a daily capacity of 150 tons. The Union Carbide Co. will take charge of the mill and mine as soon as the improvements are completed.

The American Metals & Exploration Co. has closed contracts for the acquisition of the Daisy, Keystone, Ajax, and Hercules mines, Gunnison, Colo.

W. A. Stewart, Colorado Springs, and William Sullivan, Denver, have purchased the Bandora group of six patented claims on South Mineral Creek near Silverton, Colo. The purchase price was in the neighborhood of $100,000. Jack Claibourne and L. W. Ballard, both of Silverton, have been awarded a contract to drive a tunnel in the largest claim. The Bandora is a zinc, lead, gold, and silver property.

The Fidelity Title & Finance Co., Davenport, Iowa, has taken over the San Juan Chief, the Crater company, and several other mining properties in the San Juan triangle near San Juan, Colo. P. F. Giblin is resident manager and Celeste Fattor superintendent. Work on the Crater group will also be augmented by installation of power machinery at an early date.

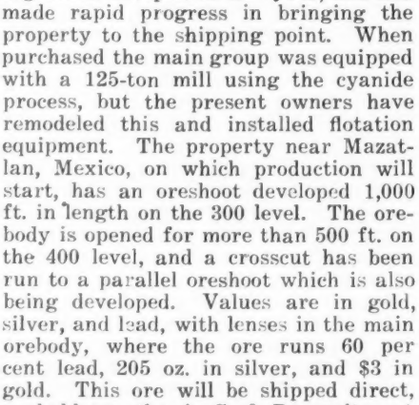
The new mill of the International Smelting Co., Rico, Colo., which has been under construction for several months, will be ready for operation Nov. 1. Thousands of tons of ore are stored awaiting the opening.

Tough-Oakes Increasing Mill Capacity

Lateral work on the Tough Oakes Burnside, Kirkland Lake, Ontario, at the 1,350 level has encountered the downward continuation of the ore zone. The mill is handling around 150 to 160 tons of ore daily, but is being further increased to 180 tons. Costs have been reduced to less than $6 per ton. The zone 350-ft. in length between the diabase dike and the boundary of the Sylvanite continues to be the chief source or ore.

Mexican Premier Mines to Make Shipments Soon

The Mexican Premier Mines Co. was organized in April of this year, and has made rapid progress in bringing the property to the shipping point. When purchased the main group was equipped with a 125-ton mill using the cyanide process, but the present owners have remodeled this and installed flotation equipment. The property near Mazatlan, Mexico, on which production will start, has an oreshoot developed 1,000 ft. in length on the 300 level. The orebody is opened for more than 500 ft. on the 400 level, and a crosscut has been run to a parallel oreshoot which is also being developed. Values are in gold, silver, and lead, with lenses in the main orebody, where the ore runs 60 per cent lead, 205 oz. in silver, and $3 in gold. This ore will be shipped direct, probably to the A. S. & R. smelter at



Concentrating plant at the Mexican Premier Mines Co., near Mazatlan, Mexico

El Paso, Tex., but later the product probably will go by water either to Selby or the Tacoma smelter.

The Mexican Government recently let a contract to dredge and enlarge the harbor and build breakwaters at Mazatlan at a total estimated cost of 7,000,000 pesos.

R. K. Neill, of Spokane, is president of the Mexican Premier Mines Co., and Raymond Guyer, of Spokane, mining engineer, is managing director.

White Delf Ships 14 Cars of Ore

Compton I. White, of Clarksfork, Idaho, reported to the last meeting of the Northwest Mining Association at Spokane that leasers of the White Delf Mining & Development Co. have shipped 14 carloads of ore from the property at Clarksfork and that they have received $21,000 from the smelter, with returns from four cars not in. Prospectors have opened several new veins east of the Elsie K which are very promising. The Lawrence has shipped a total of more than $100,000 worth of concentrates. The C'arinda mine, under direction of the federal court, is sinking to a lower depth to prove the vein which is in dispute over apex rights, and no more ore will be shipped at the present.

Red Lake Area Mapped

In accordance with the mapping program arranged for by the Canadian Topographical Survey, in co-operation with the Surveys Branch of the Ontario Department of Lands and Forests and the Royal Canadian Air Force, a provincial map of the Red Lake district has been issued to meet the urgent need of authentic topographic information. Publication of map sheets of the territory surrounding the Red Lake region is also being undertaken. Two of these maps already issued are the Lac Seul and the Pointe du Bois, embracing the territory lying respectively southeast and southwest of Red Lake, and north of the Canadian National Railways. A third, now ready for issue, comprises the area lying northwest of Red Lake.

Katherine Extension Sinking to the 350 Level

The Katherine Extension, adjoining the Katherine Gold Mine, Kingman, Ariz., has attained a depth of approximately 280 ft., and the shaft is to be continued to the 350 level before drifting or crosscutting is undertaken. A faulted segment of the vein is believed to have been encountered in the shaft. The ore is said to pan freely, and it is believed that the gold-bearing channel is near at hand. The work is under the direct supervision of R. L. Dimmick and Charles R. Waters, officials of the Katherine mine, who are said to control a large block of Katherine Extension stock.

Nevada Douglass Completes Financial Arrangements

The Nevada Douglass Gold Mines, Inc., Mina, Nev., with a developed gold property in the old Douglass district, about 10 miles southwesterly from Mina, has completed new financing and it is reported that construction work is to be resumed at once on the partly completed 100-ton cyanide plant.

This company, under the leadership of Harry Springer and L. W. Wilson, ran a small pilot mill during the development stage of the property. Some ore of good grade was opened up, but the major tonnage developed was low-grade mill ore, and it was decided to reconstruct the mill and increase daily tonnage to 100 tons. Financial troubles necessitated discontinuance of mill construction before the plant was completed.

Morenci Branch of Phelps Dodge Entertains Employees

Eight hundred employees of the Morenci branch of the Phelps Dodge Corporation were banquet guests recently of J. P. Hodgson, manager, at the Morenci ball park. The employees had been divided into two divisions in an effort to eliminate lost-time accidents. The mining division lost. A full month without accidents was reported by the second division, embracing the milling, smelting, mechanical and other surface employments. A special train brought the guests from Clifton and outside points.

The Rand Celebrates Its Fortieth Birthday

By John Watson

The fortieth birthday of the Rand gold field was celebrated in Johannesburg, S. A., Sept. 22. The functions arranged began on Tuesday afternoon, when the Mayor entertained the pioneers at a garden party in Joubert Park and, in the evening, gave a dinner to the pioneers at the Carlton Hotel. At the Rotary Club luncheon, on Tuesday, David Draper, geologist, and other pioneers were the principal guests. A pageant left the Union Ground at 2 p.m. on Wednesday, and this procession illustrated the story of Johannesburg's development, from the native hut and pioneer prospectors through the various stages of evolution to present-day plants.

Giant arches were constructed in front of the Johannesburg Town Hall by the Chamber of Commerce, symbolizing industry as supporting the world.

Under the auspices of the Johannesburg Publicity Association, William H. Auret Pritchard gave an account of the early days of the Rand and Johannesburg. At Wilgespruit, five miles north of Roodepoort, Fred Struben discovered the Confidence Reef in 1884, and in December, 1885, he and his brother Henry erected a five-stamp battery, driven by a water wheel. George Walker, an old Barberton digger, had worked with the Struben brothers on the Confidence Reef. In February, 1886, Walker was helping a mason to build a house, when one Sunday morning, crossing the veld near Langlaagte, he stumbled on a stone, jutting out of the ground. Walker examined this stone, which seemed peculiar, and on "panning" it, he found it carried gold. This was the discovery of the Main Reef. Mr. Struben then located the main reef on the farm Vogelstruisfontein, and it was there that the first shaft was sunk to a depth of 40 ft. The late J. G. Bantjes in 1886 also discovered, first, the Bird Reef and, later, the Main Reef on the farm Roodepoort. Such is the story of the early discovery of what has, so far, proved the world's greatest gold field.

Guanajuato Depressed by Low Price of Silver—Other Conditions Good

With silver nearing 50c., depression is the keynote of the camp at Guanajuato, Mexico. The operating companies are having the hardest time they have experienced for many years and are cutting down expenses wherever possible. They have lately petitioned, through the local Chamber of Mines, both the federal and state governments for a complete rebate of all production taxes as long as silver remains below 62½c.

The companies operating in the neighborhood of Guanajuato have been ordered to construct a pipe line to carry off mill tailings, it being claimed that their discharge into the river is injuring agricultural lands along the river banks. They are fighting the order on the grounds that they cannot afford the heavy cost at present.

Conditions generally, as far as the mining industry is concerned, would be satisfactory were it not for the silver situation. There is an oversupply of labor.

Guanajuato Reduction & Mines Co. continues to operate its Guanajuato and La Luz units at full capacity, a monthly tonnage of approximately 24,000 metric tons being milled.

Guanajuato Consolidated Mining & Milling Co. is operating its Pastita mill at a monthly capacity of 10,000 metric tons, the ore being obtained from its Sirena group of mines and purchases from small local producers.

United Mines Co. will soon start up its Melladito flotation mill, which will be fed with ore from the Puertecito mines. Development operations in these mines have been carried on uninterruptedly for a number of years and it is understood that a considerable amount of good-grade ore has been opened up.

The Cubo Mining & Milling Co. continues to mill and treat at its Tajo de Dolores plant between five and six thousand metric tons per month. Most of the ore is obtained from its Villalpando group of mines, the rest being purchased from the owners of the Taja de Dolores mine, the Providencia Mining & Milling Co.

The Cia. Minera, Explotadora y Beneficiadora de Guanajuato is operating under lease the San Cayetano group of mines in the La Luz district, and is treating at the San Cayetano mill and plant about eighty metric tons of ore daily.

Nickel Currency for Argentina

The Argentine Legation at London has been authorized to purchase 15,000.000 disks of nickel to be coined into 10 centavo pieces, according to a report to the U. S. Department of Commerce. Coinage will be done by the mint at Buenos Aires. The new coinage will be to relieve a scarcity of metallic coinage and will be only offered by the mint in change, thus not increasing the present total currency circulation.

Mining Operations South of Douglas Hampered by Floods

During the last three weeks, since the extremely heavy rains along the Mexican border, concentrates from the Moctezuma mill at Nacozari, Sonora, Mexico, have had to be piled, as the railroad was out of commission. The first trains south went out of Douglas Oct. 15, and the stockpiled concentrates will now be shipped to Douglas as rapidly as transportation permits. Last month, according to custom house figures, Moctezuma ores and concentrates, shipped to the Copper Queen smelter at Douglas, amounted to over 100 carloads, or 5,200 tons, valued at 512,000 pesos.

The Tigre mine shipped in twelve carloads of silver ore, weighing 490 tons and valued at 480,000 pesos. One carload of gold-silver ore from the Chispas mine, at Fronteras, billed to El Paso, weighed forty tons and was valued at 50,000 pesos.

Toronto Letter

By Our Special Correspondent for Northern Ontario

Ontario Liquor Policy to Be Settled by Voters—New Beaver Directors Rescind Action of Old Board

Following the recent Dominion election, the Ontario Government has decided to go to the people and will make its appeal on a liquor policy featured by the sale of liquor under government control. If the present government wins, its profits from the liquor business should do away with the possibility of increased mine taxation. The province needs revenue, but the present government has wisely realized that the development of the natural resources and a steady revenue from a large number of mines is of more importance than a large revenue from a few mines. In this respect Ontario conditions have been the envy of operators in other countries, and this is one of the reasons why outside mining capital seeks investment in this country. The mining industry is also interested in the fact that under the present government Ontario has had the best administration of the Department of Mines in its history. The election will be a real fight, and the industry views with considerable apprehension the possibility of losing the services of the Hon. Charles McCrea, Minister of Mines, on the question as to whether the province will be dry or wet.

Shareholders' meetings of the Vipond mine, of Porcupine, and the British Porcupine Mines, of England, have been called, and the shareholders will be asked to ratify the proposed sale of the assets of the last-named company to the Vipond. The consideration is 250,000 shares of Vipond stock. It is understood that English interests have agreed to the terms, and when this arrangement is consummated the Vipond will, in addition to its present property, control the Porcupine-Crown and the Thompson-Krist properties as well. The Porcupine-Crown was one of the early producers of the Porcupine camp, but below 1,000 ft. the vein was narrower, the shoots were shorter, and the values much lower. It is believed, however, that this vein dips into the Vipond ground at greater depth.

American Holdings in Ontario Mining Stocks Decline

The gradual transfer of American holdings in Ontario mining stocks to Canadian holders will probably be accelerated by the action of New York brokerage houses in refusing to carry Dome on margin and increasing the margin required for McIntyre. When Dome dropped below $10 a share, New York houses refused to carry it on margin any longer and at the same time increased the margin on McIntyre, so that purchasers must put up between 50 and 60 per cent of the market price. A comparatively short time ago there was as much McIntyre held in the United States as in Canada, but the Canadian holdings now predominate. This same condition exists with Teck-

Hughes and also with Noranda, which at the start was almost entirely controlled by Americans, but in which Canadians are now understood to hold about 55 per cent. This transfer has also been helped by the changed attitude of the Canadian banks with regard to mining stocks, as they no longer hesitate to loan substantial amounts on good mining securities.

PIONEER MINING DEVELOPMENT IS ENCOURAGING

Officials of the Pioneer Mining Corporation, which is one of the Huronian Belt companies, appear confident that they have a mine in the Cooper property in the Michipicoten district north of Sault Ste. Marie. On the 100 level the vein has been drifted on for a length of 550 ft. and shows approximately $10 across a width of 5 ft. Diamond drilling has intersected the vein at depths of 400 and 500 ft.

The Pioneer has also taken up two groups in close proximity to the Cooper, and two important discoveries have been made. On the Wa Wa group a number of quartz veins have been found, some of which carry free gold. On the Michael group a vein has been found and stripped for 175 ft., where it shows an average of $10 across 8 ft.

The Pioneer also has a promising lead-zinc property in the Gaspe Peninsular adjoining the Federal Zinc Co., which is controlled by Montreal people. On the Federal property the veins have been proven to a depth of 300 ft., and on the Pioneer property a number of surface exposures have been found which vary in width from a few feet up to a total of 78 ft.

Developments on the Argonaut property, in the Larder Lake district, continue to give better results. The best vein found to date on this property is the 1018 vein, or the 10th level. The ores in the 1018 vein on the 1,000 level are very similar to the high-grade copper-gold ores of the Noranda.

It is expected that the McKinley-Darragh property, of Cobalt, will continue operating into the winter to clean up the broken ore and some high-grade ore in the backs of old stopes. The company has about $250,000 in the treasury, half of which has been invested in the better class mining stocks and a good profit on this investment has already been shown.

The new directors of the Beaver have rescinded the dividend declared by the old board. Action of the new board in rescinding the dividend will not be allowed to stand without challenge, as some shareholders claim that once a dividend is declared it becomes a debt of the company and that they are entitled to demand the dividend on the date set for its payment.

Quinte Gold Resumes

Work has been resumed on the Quinte Gold Mine, Ltd., Teck township, Kirkland Lake district, Ontario, on which an important find of copper has been made. E. S. Hill, general manager, reports that dewatering operations are under way, and the 300-ft. shaft is cleared to a depth of 200 ft. Preparations are being made to sink to the 1,000 level.

London Letter

By W. A. Doman

Special Correspondent

British Empire Alert on the Tin Situation—Rhodesian Copper Attracts Attention

London, Oct. 12.—There are one or two questions anent raw materials equally interesting on both sides of the Atlantic. For instance tin, rubber, copper, and oil. Of the metals at the moment tin occupies the most prominent place. Search is being made for it in different parts of the British Empire, and arrangements are being made to work every deposit, no matter how small, so as to take advantage of the present price. As I have remarked previously, new companies cannot add greatly to the production for some time to come, and existing companies can increase it only gradually. The demand is growing, and different finance firms are sending out engineers to examine old properties or to inspect reported new finds. Spain and Portugal are, so to say, being combed over, and one or two little areas have been floated. Whether they will make good cannot yet be determined, and it is fairly certain that some of them would not have received consideration had it not been for the demand for the metal exceeding the supply and the talk of a famine, in which almost everyone connected with the tin-winning industry seems to believe. Almost every little stream in Cornwall is being washed, the Australians are turning attention to the old Tingha, and Tasmania is getting a look in. The price of the metal fluctuates a few pounds per ton, and buyers apparently wait for a fall, but the general tendency is upward, and with the inquiry and uses for the metal increasing there does not seem much prospect of a setback of any moment. There is more speculation in shares than in the metal, and few purchasers can have lost on a deal.

Next to tin, copper is receiving a fair amount of attention, owing to developments that are taking place in Rhodesia. On questions of policy a little disagreement is reported to have taken place among the directors of the Southern Rhodesia Base Metals, and it has even been suggested that A. Chester Beatty may resign. As he is out of town at present no one can speak definitely upon the point. From rumors that reach me from one quarter he has tried to exercise a moderating influence; in other words, has not allowed optimism to run away with him. Some big speculators who have bought shares say that everyone in Rhodesia speaks well of the undertaking, but that views are not so hopeful when applied for at the London office.

Efforts to resuscitate the West Australian mining industry continue to be made. It is firmly believed in some quarters that payable mines could be opened up if only the government would give some assistance. Unfortunately, a Labor Government is in power, and some of its legislation apparently takes no account of economics nor of how much-needed capital is prevented from entering Australia. While the extremists rule, little, if any, money is likely to leave this country to be risked in mining. In fact, Australian finances generally are being rather severely criticized.

Importation of Pig Iron from India Not in Violation of Law

The Department of the Treasury, after an investigation, has declined to issue a finding of dumping covering pig iron from India. Brigadier General Lincoln C. Andrews, Assistant Secretary of the Treasury in charge of customs and prohibition enforcement, has issued a letter to collectors of customs in which he says "The department is unable to find that the Antidumping Act has been violated by reason of the importation of pig iron from India, and declines to issue a finding of dumping covering such merchandise. Appraisement reports covering pig iron from India need, therefore, no longer be withheld so far as any question of dumping is concerned."

The complaint of certain domestic manufacturers of pig iron alleged that the importation of this commodity from India was in violation of the Antidumping Act. This complaint was partly based on published information that the invoice value of pig iron from India was a trifle under $13 per ton, whereas the price for domestic consumption in India was $20 per ton. Mr. Andrews said that after an investigation this information was found to be erroneous.

International Nickel Sinking Two Shafts

According to a report from Copper Cliff, Ontario, the International Nickel Co. is now sinking two new vertical shafts on the Frood or No. 3 mine. These shafts, when completed, will be the largest in Canada. It is understood that the present objective is 2,200 ft. There is an incline shaft at present on the property, where a large tonnage of ore has been already proved by diamond drilling.

Labor at Michigan Copper Mines

The copper mines of Houghton and Keweenaw Counties, in the Michigan district, are employing 870 more men than a year ago. Total number employed is 9,405, the highest since 1919. Houghton County mines are employing 670 more men than a year ago and Keweenaw County mines 200 more. No mines are operating in Ontonagon County. The increase has been largely in the under-ground departments. In Houghton County, 4,744 men are employed under-ground and 2,980 in the mills and on surface. Calumet & Hecla Consolidated and Copper Range added the largest number of men to their respective forces. In Keweenaw County, 1,681 men are employed. At the Ahmeek mine there are 716; at the Mohawk mine and mill, 581; and at Seneca, 321.

Melbourne Letter

By Peter G. Tait
Special Correspondent

Shotover River Dam Completed —Committee Appointed to Report on Gold Mining Industry

Melbourne, Sept. 21.—The Kawarau Gold Mining Co. completed the erection of its dam at the outlet of Lake Wakatipu, N. Z., at the end of August and the gates were closed on Aug. 31. The river did not fall to the extent anticipated, owing to the fact that the snow on the mountains began to thaw, and a considerable volume of water came in from the Shotover and other tributaries. The claim holders were on the spot ready to get into the bed of the river, but they found, as some anticipated, that many feet of overburden thrown into the channel during the earlier period of activity on the river banks must be removed before the supposedly rich auriferous bed can be worked. Now that the dam has been completed, claim holders will have an opportunity of facing the situation before next winter. The problem is how to work the bed of this swiftly flowing river. It is now realized that, even with the main flow from the lake cut off for comparatively brief periods, there will still be some feet of water in the bed, necessitating the use of some mechanical contrivance.

Central Australia is still attracting considerable attention on the part of prospectors and investors. Captain G. A. Richards, formerly general manager of the Mount Morgan company, and a companion are going to Central Australia via airplane from Cloncurry, to investigate reports of a wonderful discovery.

E. C. St. Smith, of the Queensland Geological Survey, has obtained leave of absence from the department and is visiting the Malay States, Siam, and Burma, on behalf of an Australian company interested in the tin deposits there.

Gold Committee Appointed

The Prime Minister of the Commonwealth, S. M. Bruce, before leaving for London recently announced that the Development and Migration Commission, of which H. W. Gepp is chairman, has been requested to investigate the present position of the gold-mining industry. The commission has appointed a technical committee comprising W. E. Wainwright, general manager of Broken Hill South, Ltd.; A. J. Gibson, consulting engineer of Sydney; C. H. J. Clayton, of Broken Hill, and A. W. Hutchin, industrial officer of the Electrolytic Zinc Co., to report on the matter. The committee is visiting the Kalgoorlie field early in October. It is expected their report will be furnished in about six weeks.

A new gold find is reported at Glenelg Hills south of Southern Cross, Western Australia, on Hughes & Morton's claim, a mile and a half from Hollow and Heaton's Reward. The Inspector of Mines for the district has visited the field, and he expresses the opinion that it is "the best purely surface show I have ever seen." As this district is noted for its surface patches, and as comparatively little development work has been done, it is too soon to express any definite opinion. The nearest ore treatment plant is at Parker's Range, 35 miles distant.

Very little news has filtered through regarding the New Guinea gold field at Edie Creek, but it is reported that a number of men are waiting at Rabaul and Salamoa Bay for transport "boys." The administrator of the territory is seeking to prevent a rush by stressing the difficulties and expense of getting to the field. He points to the fact that comparatively little gold has been produced; but against this is the statement that those who have produced the gold are storing it on the field rather than send it away under the primitive conditions obtaining. Guinea Gold, an Adelaide company which sent Jas. Hebbard to report on the field, has dispatched a mining engineer to look after its interests.

The Australian Radium Corporation, which is a combination of the five companies operating on the radium ores in South Australia, has purchased the treatment plant and equipment erected by the Radium and Rare Earths Treatment Co. at Dry Creek, near Adelaide, South Australia. The concentrating plant at Mount Painter is now in operation, and concentrates are being sent forward to Dry Creek.

Mexican Gold Exports Must Be Balanced by Imports

Exporters of ore from Mexico containing a greater proportion of gold than two grains per ton are obliged by a decree promulgated Oct. 7, 1926, to reimport a quantity of gold equivalent to that which the ore contains, either in the form of refined gold bars or foreign gold coin, according to a report to the U. S. Department of Commerce. The reimportation must take place within thirty days from the time the ore is exported, and in case of failure to reimport, a fine of 10 per cent of the value of the gold which should be reimported will be collected.

Reimportations may be made through branches of the Bank of Mexico, S. A. In case the gold is presented in the form of American gold coin, the bank will make payment by means of a silver draft, at the rate of two for one. If other foreign gold coin or gold bars are presented, or if exporters reimport for their own account, then the mint at Mexico City will recoin the gold, and the Bank of Mexico, S. A., will make payment in Mexican gold or in gold drafts on New York.

Copper Discovered at La Sarre, Quebec

A copper discovery of major importance has just been made three miles north of the town of La Sarre, Quebec, on lots Nos. 49 and 50, Range 9, La Sarre township, by Peter McGinley, one of the field operators of the Norrington Development Co., Ltd. The orebody has been opened for a length of 200 ft. and exposes an 18-ft. copper-zinc deposit.

Johannesburg Letter

By John Watson
Special Correspondent

Transvaal August Gold Production £3,584,464—Sub-Nigels Have Upward Trend

Johannesburg, Sept. 14.—The output of gold for the month of August was declared by the Transvaal Chamber of Mines on Sept. 10 as 843,854 oz., having a value of £3,584,464. August had five Sundays, whereas July (the record month) had only four. The August daily average was 32,454 oz. for each working day, compared with 31,857 in July. The native labor returns show 184,032 "boys" working on the Witwatersrand gold mines on Aug. 31, which is an increase of 1,770 over the figure on July 31.

Platinum Production Drops

The reduction plant of Onverwacht, Ltd., milled 1,369 tons during August. The crude platinum produced was estimated to contain 530 oz. of platinum and allied metals, equivalent to 7.7 dwt. per ton milled. The drop in output is due to the lower grade of ore mined, mainly from the 150-ft. and 200-ft. levels, where previous development showed values below the average. The prospecting shaft, sunk from the 300-ft. level, has shown 7.8 dwt. platinoids average from 330 to 340 ft. and 6.8 dwt. average from 340 to 350 ft. Crosscutting on the 350-ft. level has been started. In July, 1,560 tons of ore milled gave 849 oz. of platinoids, equal to 10.9 dwt. per ton.

British Mint Dates From 150 B. C.

J. I. Becklake, superintendent of the Royal Mint, Pretoria, gave an address on Sept. 10 to the South African Banking Institute on the mints of the British Empire. The first British mint, according to Sir John Evans, dated from about 150 B. C. Since 1870, it has coined over 6,000 million pieces and its net annual average profit, since that date, has been about £650,000. As one desirous of developing South African activities and interests wherever possible, Mr. Becklake would like to see the Pretoria mint take first place, at least in the gold coinage, of the Empire, and so far as he could judge it should do this as a natural consequence of being situated in the largest gold-producing area in the world, if gold coins are to be brought extensively into circulation once again.

On the Johannesburg Stock Exchange last week the share market has been active, though the Jewish New Year holiday, on Sept. 9, curtailed business somewhat. London bought and sold here during the week to only a moderate extent. The chief feature of the week has again been Sub-Nigels, in which enormous business was done, and their price has risen from 55s. 7½d. to 59s. 6d. The Boksburg Gap group of gold mines had a sharp decline on the publication of the second lot of low-grade assays. Business in hand and platinum shares has been quiet.

Societies, Addresses, and Reports

Princeton Seeks Funds for Laboratory for School of Engineering

Courses, Established in 1921, Stress Fundamental and Cultural Subjects—Fifth Year Recommended for Special Training

ONE OF THE OBJECTIVES for which funds are being sought by the committee directing the Princeton Fund is an engineering laboratory to house the School of Engineering at Princeton University. Present facilities are quite inadequate.

The appeal is based on the fact that the engineering course at Princeton differs materially from the courses offered at other universities and technical schools. In fact, the trustees of the University only granted the request of the engineering alumni for the revision of the old courses that resulted in the present plan on the distinct understanding that Princeton did not intend to compete in engineering with the well established colleges, east and west. It was not their desire to add another standard engineering school to this list, but they felt that if the fundamentals of the various branches of engineering could be included with cultural subjects they would be willing to establish the other courses. This attitude was based partly on expressions, by prominent practicing engineers and educators, of the opinion that more cultural studies should be given a place in the engineering curricula. Some schools have met this requirement by demanding two years of collegiate work for admission into the engineering school, while others have demanded a degree, or at least four years of work, to which two years of technical work have been added for the engineering degree.

English, Modern Languages and Economics in First Two Years

At Princeton the desires of the trustees have been met by the curricula which offer the fundamental engineering and scientific courses combined with the maximum amount of liberal subjects possible under this arrangement. The cultural subjects have been cared for by requirements in English, modern languages and economics in the first two years and by a certain amount of elective freedom in non-engineering subjects in the two later years. All of the engineering work is thus placed in a School of Engineering established in 1921 in which four-year courses are offered in civil, electrical, mechanical, chemical, and mining engineering. Each of these courses of four years includes the fundamental subjects, so that graduates are prepared to take subordinate positions where fundamentals, but not detailed engineering preparation, are required, the detailed special engineering subjects of the regular school remaining for a fifth year. At the end of four years the degree of B.S. in Engineering is given, while at the end of the fifth year the degree of Civil Engineer, Electrical Engineer, Mechanical Engineer and Chemical Engineer is given. Princeton will not offer a fifth year in mining engineering, as it feels that this strictly technical work can be better done at one of the regularly established schools of mining engineering. The Princeton preparation takes the student within two years of the mining degree.

Undergraduate Course to Prepare for Business Career

The undergraduate course is especially adapted to those students who plan to enter upon business careers in which engineering knowledge and training are required, although the students who plan to enter upon the career of an engineer are well fitted in four years to enter upon it. For definite training, however, the fifth year would be of value. It is the expectation of the Princeton engineering faculty that at least half of the graduates will return to Princeton for the fifth year, although others may desire the experience and training of a fifth year at another engineering school. The schedule at Princeton should fit its graduates to enter the senior class of other engineering schools.

Oil-Shale Industry

In the report of the meeting of the Mining and Metallurgical Society in the issue of Oct. 23 the statement was made that Guy C. Riddell "predicts that within, say, twelve years a huge industry, involving the mining of upwards of 350,000,000 tons of shale and the production of 225,000,000 bbl. of oil per annum, will develop." Mr. Riddell is of the opinion that he did not mention any specific number of years and says that the statement quoted is misleading. While twelve years will see a great deal accomplished in the erection of plants, on mature reflection he thinks that it may be two or three times as long before the production mentioned will be attained.

North Carolina University Has New Geological Building

The department of geology, University of North Carolina, plans to move into its new geological building about the first of January. The new building is of fireproof construction, has four stories and a basement and will house geology, mineralogy, and geography besides a large departmental library and a museum. Special features of the building are a precision research laboratory and a seismograph for the detection of earthquake shocks.

Power Show Dec. 7 in New York

The Fifth National Exposition of Power and Mechanical Engineering will take place in the Grand Central Palace in New York during the week begining Dec. 6, 1926. The show will be paralleled by meetings of two great American technical societies. The American Society of Mechanical Engineers will hold its meeting in the Engineering Societies Building during the first four days of the week and the American Society of Refrigerating Engineers will hold its sessions at the Hotel Astor for three days starting Tuesday, Dec. 7.

Refractories Institute at Pittsburgh

The regular fall meeting of the American Refractories Institute was held at the University Club, Pittsburgh, Pa., on Oct. 21. A luncheon followed the meeting.

On the technical program were the following: Gordon B. Wilkes, Massachusetts Institute of Technology, Cambridge, Mass.; R. F. Geller, Bureau of Standards, Washington, D. C.; Samuel J. McDowell, superintendent, Bureau of Standards, Columbus, Ohio; L. E. Hankinson, West Penn Power Co., Pittsburgh, Pa.

Stuart M. Phelps, director of research and tests of the Refractories Fellowship, Mellon Institute, Pittsburgh, Pa., presented a paper on "Plastic Refractories."

E. A. Sperry Awarded John Fritz Medal for 1927

On Oct. 15 the John Fritz Gold Medal for 1927 was awarded to Elmer Ambrose Sperry, of New York, for the development of the gyro-compass and the application of the gyroscope to the stabilization of ships and airplanes. This annual award was made unanimously by the board of sixteen representatives of the American Societies of Civil, Mining and Metallurgical, Mechanical and Electrical Engineers, having an aggregate membership of 56,000.

The medal is awarded not oftener than once a year for notable scientific or industrial achievement, without restriction on account of nationality or sex. It is a memorial to John Fritz, late of Bethlehem, Pa., long a leader in the American iron and steel industry.

This is the twenty-third award. The first was to John Fritz in 1902 in celebration of his eightieth birthday. A few of the other medalists are Lord Kelvin, George Westinghouse, Alexander Graham Bell, Charles T. Porter, Alfred Noble, James Douglas, and Henry M. Howe.

The presentation of the medal will take place at 8:30 Tuesday evening, Dec. 7, in the Engineering Auditorium, 29 West 39th St., New York, in connection with the annual meeting of the American Society of Mechanical Engineers. The medal will be presented by Frank B. Jewett, Ph.D., chairman of the board which made the award.

Members of the four Founder Societies and ladies are invited to attend the presentation of the medal and the other ceremonies of the evening.

Montana Engineers at Butte

At the October meeting of the Montana Society of Engineers held at Butte, the contract system of mining, now in vogue in the district, was discussed by William A. O'Kelley, of the Anaconda company; Everett H. Parker, of the Elm Orlu Mining Co.; A. J. Healy, of the Butte & Superior Mining Co.; and E. M. Williams, of the North Butte Mining Co.

After the discussion, Alan M. Bateman, professor of geology at Yale, presented an illustrated travelogue of Spain, Africa, Italy, France, and the Rhine, dwelling at length on the history of the Rio Tinto mine and the water system established by the Romans in Pompeii more than 1,857 years ago and which still is in good condition. He stated, "The pipes are still good, and all that is needed to set in action the ancient fountains in the gardens of the villas, buried nearly two thousand years under volcanic ash, is the addition of valves and nipples. The valves and nipples were of iron and rusted away, while the pipes of lead withstood the ravages of the centuries."

Empire (British) Mining Congress

An announcement from London on behalf of the Empire Council of Mining and Metallurgical Institutions, composed of ten societies in the British Empire, has the following to say regarding the second (triennial) Empire Mining and Metallurgical Congress to be held in Canada in August-September, 1927:

"The opening session will be held in Montreal, on Monday, Aug. 22. An influential organizing committee representative of the whole of the dominion has been constituted, and an exceptionally attractive program is now practically completed. It embraces sessions in Montreal, Toronto, Winnipeg, and Vancouver, with visits to mines and works and places of scenic beauty throughout the dominion. The full program will occupy about six weeks in Canada.

"The organizing committee had secured the full approval of the congress by the dominion and provincial governments, and the Minister of Mines has emphasized the direct interest and support of the dominion government by accepting an invitation to act as president of the congress. The fullest information will be embodied in a comprehensive series of communications to be issued to members of the constituent bodies by the organizing committee, through George C. Mackenzie, secretary of the Canadian Institute of Mining and Metallurgy, the general secretary of the congress, whose address is Drummond Building, Montreal, Canada."

National Research Council Seeks Aid in Compiling Lists

The National Research Council published in 1921 a list of Research Laboratories in Industrial Establishments of the United States, which apparently fills a need in the industrial world. The officials of the Council have made the following announcement:

"It is undoubtedly true that since 1921 a large number of industrial concerns have established research laboratories. It is also probably true that the 1921 list does not contain a complete roster of the firms which had laboratories at that time. In order that the new list may be as complete as possible, we are appealing to the readers of technical journals who are connected with firms now maintaining research laboratories to send us a postcard giving the name and address of the firms with which they are connected. Questionnaires will then be sent to these firms. The value of such a compilation lies first in its accuracy; second, in its completeness. Please address your postcard to the Research Information Service, National Research Council, B and 21st Streets, Washington, D. C."

State Geologists Tour Virginia

A field trip through Virginia has been made by the American Association of State Geologists, which is visiting the Old Dominion for its annual tour

Wilbur A. Nelson

for the first time since the founding of the organization. Wilbur A. Nelson, Virginia State Geologist and head of the school of geology of the University of Virginia, conducted the party on the first leg of its trip, which included a visit to Monticello, the home of Thomas Jefferson; a half day spent at the soapstone quarries at Schuyler, and a journey across the Blue Ridge Mountains to the Grand Caverns of the Shenandoah and to Waynesboro. At Schuyler the geologists saw the works of the Virginia Alberene Corporation, the largest soapstone quarries in the world.

Mine Support Discussed by C., M. & M. S. of South Africa

The September meeting of the Chemican, Metallurgical and Mining Society of South Africa was held in Johannesburg on Sept. 18. The following papers were introduced by their authors: "Support of Workings on the Van Ryn Deep," by A. E. Payne; "Method of Support of Hanging on the New State Areas, Ltd., with Special Reference to Concrete Columns," by Jos. Richardson; "Concrete Plus Chock Supports in Far East Rand Mines," by J. D. Marquard.

Inspect Stevens County Mines

Twenty members of the Mining Bureau of the Spokane Chamber of Commerce made a two-day trip of inspection to mines of Stevens County, Wash., on Oct. 1 and 2. The party was headed by Frank M. Smith, chairman of the bureau, and smelter director of the Bunker Hill & Sullivan Mining & Concentrating Co. W. Lon Johnson, of Colville, Wash., Lieutenant Governor of the state, and interested in the Old Dominion, Big Iron, and other mining properties of Stevens County, was in charge of the reception at Colville.

Topographical Surveys in Kentucky

Through the efforts of Dr. Willard Rouse Jillson, State Geologist of Kentucky, additional state funds in the sum of $30,000 have recently been secured for co-operative topographic mapping. With previous appropriations amounting to $20,000 and a contribution from the U. S. Geological Survey, $100,000 is now available for new topographical work in Kentucky during the present fiscal year. About sixty engineers are now engaged in government topographic work in Kentucky, which is now slightly in excess of 50 per cent mapped topographically.

Prizes Awarded for Best Gardens

Announcement is made by the Oliver Iron Mining Co. of the annual award of prizes for the best gardens and the best-kept premises in the villages where that company has mining property. The list for Itasca County, Minn., towns and locations is impressive, and indicates that the people who live in company-owned houses have a keen sense of responsibility, and that they take pride in the appearance of their homes.

Lessons of Petroleum Meeting

The Tulsa meeting of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers demonstrated among other things universal interest in new methods of producing oil, according to the *Oil & Gas Journal*, as was proven in this case by the large attendance of engineers from every part of the country where oil is produced. Another point demonstrated was that however much engineering skill has been applied to production problems, nothing has yet been evolved that has a general application, and that each field offers its own problem; a third point is that assuming certain set conditions as to sand depth, thickness, porosity, saturation, presence or absence of breaks, expulsive force, it is possible for an engineer to work out a means of accomplishing what he sets out to do. But when he encounters the innumerable variables which characterize the production end of the oil business his method would become useless. Therefore the engineer does no work on assumptions but on the cold facts presented by his immediate job and he plans his work to fit that particular job.

Recent Technical Publications

Reviews, Abstracts, and References

Corrosion. Causes and Prevention. An Engineering Problem. By Frank N. Speller. McGraw-Hill Book Co., New York City. Price $6.

This strikes the reviewer as far and away the best book on corrosion that has so far been published in English, if not in any language. It is a mine of information on the subject, from both the theoretical and practical standpoints, compiled by an authority who is employed by a large manufacturer to whom the subject of corrosion is of paramount interest. He has been assisted to some extent by other specialists.

Corrosion of the ferrous metals is given more attention than is devoted to that of the non-ferrous metals, most of the author's experience having been in that field, though much valuable matter regarding the effect of gases and liquids on non-ferrous metals and alloys is also included. Those who wish more complete information on specific subjects will find a bibliography of several hundred references, selected from an unpublished bibliography of 7,000 articles on corrosion in the files of the National Tube Co.

The book is well written and typographically attractive. It should be of great interest to mining engineers who have acid or alkaline liquids or gases to contend with, and this includes many mine operators as well as most of those who control concentrating plants, leaching plants, smelters, and refineries.

E. H. ROBIE.

American Industry in Chile — *The South Pacific Mail* (Valparaiso, Chile; price 2 pesos) recently issued a special 48-page American supplement describing the progress that has been made in Chilean industrial life through the efforts of United States interests. Among other articles, is one on "The American Copper Empire in Chile," describing the properties of the Chile Exploration Co. and the Andes Copper Co., and a short account of the Bethlehem Steel Corporation's iron-mining activities. The nitrate industry is also given some attention.

Placer Tin Mining—The August issue of *The Mining Magazine* (London, England; price 1s.) contains a 13-page paper by A. G. Glenister on "The Gopeng Consolidated Tin Mines," discussing the mining and concentrating operations of the first alluvial tin properties in the Federated Malay States to be operated by an English company.

Chilean Nitrate—The Oct. 25 issue of *Commerce Reports* (price 10c. from the Superintendent of Documents, Washington, D. C.) contains a 4-page article by Mason F. Lord on "The Nitrate Region of Chile and Its Ports." The economic progress of the industry during recent years is traced, and the commercial importance of the ports of Antofagasta, Iquique, Mejillones, Tocopilla, Taltal, Pisagua, Caleta Buena, and Junin is discussed.

Lighting Data — The Edison Lamp Works of the General Electric Co., Schenectady, N. Y., has recently issued a series of bulletins on the subject of lighting, including: "Theory and Characteristics of Mazda Lamps"; "Lighting Offices and Drafting Rooms"; "Lighting of the Metal Working Industries"; and "Motor Car, Garage, and Display Room Lighting." Any of these may be obtained on request.

The Electrical Testing Laboratories, 80th St. and East End Ave., New York City, has also published a 16-page bulletin, No. 105, on the "Testing and Approval of Automobile Headlamps and Tail-lamps," with rules and specifications.

Australian Mining Reports—Reports on the mining industry in Australia recently received include the following: "Annual Report of the Department of Mines, New South Wales, for 1925," Sydney, price 6s. 9d.; Report of the Geological Survey Branch, New Zealand, Wellington; "The Mineral Deposits of New Zealand," pp. 23, a description of the dominion's more important economic minerals and rocks, obtainable on request from the Mines Department, Wellington; "The Geology of the Huntly-Kawhia Subdivision," pp. 112, with colored plates, by J. Henderson and L. I. Grange, obtainable from the Geological Survey Branch, Wellington, New Zealand; "Report of the Department of Mines, Western Australia, for 1925," pp. 270, with numerous maps and plates, Perth; and "Geological Reconnaissance Between Roma, Springsure, Tambo, and Taroom," by H. I. Jensen, pp. 215, Publication No. 277 of the Queensland Geological Survey, Brisbane.

Swedish Mining—A paper by Walfr. Petersson, presented at the autumn meeting of the Iron and Steel Institute (28 Victoria St., London, SW. 1, England), is entitled "Some Notes on the Development of the Swedish Mining Industry During the Last Twenty-five Years." (pp. 19). Analyses of iron ores from many mines are given, together with the methods of mining, kind of equipment and explosives used, and methods of ore treatment. Brief reference is made to methods of exploration and electrical ore finding.

Iron Statistics—The annual statistical report of the American Iron and Steel Institute for 1925 has been issued, and may be obtained from the Institute at 40 Rector St., New York City. It contains the usual statistical data on the production, imports, exports, and prices of iron and steel.

Persia — The Persia Society, 247 Park Ave., New York City, is distributing a 38-page booklet on "The Financial and Economic Situation of Persia, 1926," by A. C. Millspaugh. Mineral occurrences are varied, though almost entirely undeveloped.

Transvaal Mining—The 36th annual report of the Transvaal Chamber of Mines, Johannesburg, has recently been issued. This consists of 180 pages in the familiar red-cloth binding, and includes the annual reports of the executive committee and the gold producers' committee for 1925, the presidential address at the annual meeting, and considerable statistical data on the mining industry.

Belgian Zinc—A brief 6-page paper on "The Zinc Industry of the Liége District," by L. Boscheron, was presented at the September meeting of the Institute of Metals, 36 Victoria St., London, S.W. 1, England. A historical account is given of the development of the industry. Absence of water-power and cheap electric power makes the electrothermic and electrolytic methods inapplicable in Belgium.

New Patents

Grinding Mill—No. 1,602,434. Oct. 12, 1926. O. H. Johnson, Denver, assignor to the Mine & Smelter Supply Co., Denver. Design for a combined ball and rod mill, the ball and rod compartments being separated by a plate, and the ball compartment being of larger diameter than that holding the rods.

No. 1,602,435. Oct. 12, 1926. O. H. Johnson, assigned as above. A rod mill with an imperforate guard plate adjacent to the discharge end, the sections of the guard plate being assembled about a central plug or filler member.

Sulphur Mining—No. 1,602,475. Oct. 12, 1926. Benjamin Andrews, Houston, Texas. A process of mining sulphur when overlying a stratum of rock salt, comprising drilling through the sulphur stratum into the rock salt, supplying a solvent for the salt at a temperature below the melting point of sulphur, thus forming a cavity in the rock salt, and subsequently heating and melting the sulphur, and transferring it to the surface. The sulphur also covers the bottom of the cavity and allows extension thereof in a lateral direction only.

Rock Drilling Equipment

No. 1,602,498. Oct. 12, 1926. E. W. McCanna, Butte, Mont. Design for a rock drill bit.

No. 1,602,953. Oct. 12, 1926. W. A. Smith, Detroit, assignor to Chicago Pneumatic Tool Co., New York City. Design for a reciprocating piston and rotary tool holder for a rock drill, operated by a rotary gear motor.

No. 1,603,403. Oct. 19, 1926. H. S. Potter, Johannesburg, South Africa. A method of making hollow tapered drills.

No. 1,603,473. Oct. 19, 1926. A. H. Katterjohn, Denver, assignor to The Denver Rock Drill Mfg. Co., Denver. Design of rock-drilling apparatus.

No. 1,604,043. Oct. 19, 1926. C. S. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J. Design of the actuating mechanism in a reciprocating rock drill.

No. 1,604,080. Oct. 19, 1926. R. H. Smickle, Belvidere, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J. A broaching attachment for rock drills.

No. 1,604,081. Oct. 18, 1926. W. A. Smith, Athens, Pa., assignor to Ingersoll-Rand Co. Design of rock drill mechanism.

People You Should Know About

H. C. Bacorn paid a brief business visit to New York last week.

Frederick Burbridge, of Wallace, Idaho, general manager of the Federal Mining & Smelting Co., is in New York.

A. H. Higgins, metallurgist for Minerals Separation Corporation, recently visited the Sullivan mine, at Kimberley, B. C.

R. A. Hardy, superintendent of the Consolidated Virginia mine, in Virginia City, Nev., is in Arizona on professional business.

C. Lee Peck, or anyone knowing of his whereabouts, is requested to communicate with the editorial department of this publication.

J. W. Sherwin, general manager of the West End Consolidated Mining Co. and affiliated companies, has been in Tonopah, Nev., from his Oakland headquarters.

F. C. Ninnis, mill superintendent for the West End Consolidated Mining Co., at Tonopah, Nev., has returned to Tonopah from a business trip to Oakland and San Francisco.

W. A. Neill, chief mechanical engineer of the Dorr Company, sailed for Europe on Oct. 23 on business connected with the interests of the affiliated English, French, and German companies.

W. C. Madge, formerly mechanical engineer of the Harold milling plant of the Tintic Standard Mining Co., has left Salt Lake to become manager of a lead-zinc property at Santa Ana, Calif.

George A. Packard, mining engineer and metallurgist, has been in New Mexico and will spend part of November in Sonora, Mexico, before returning to his headquarters in Boston.

R. D. Messler, of the Geologic Branch of the U. S. Geological Survey, left Washington on Oct. 1 for field work in Arkansas, Oklahoma, Tennessee and Virginia. He will return about Nov. 1.

Dean Ernest N. Patty of the School of Mines of the Alaska College, accompanied by the senior students at the school, has returned to Fairbanks from a geology field trip in the Alaska Range.

George R. McLaren, who has been in charge of the Stirling zinc mine, in Cape Breton, which recently closed, has left to assume the management of properties in Rouyn adjoining the Alderson-McKay.

J. C. Archibald, for many years superintendent of the Flores cyanide plant of the Guanajuato Reduction & Mines Co., has gone to Zacatecas as general superintendent of the Pittsburgh-Veta Grande Mines Co.

Lieutenant Colonel J. P. Grenfell, chairman of the Messina (Transvaal) Development Company, Ltd., has been on one of his periodical visits to Messina. He sailed from Capetown on his return voyage to England on Sept. 17.

George J. Young, of San Francisco, western editor of the *Engineering and Mining Journal,* was a recent visitor in the Coeur d'Alene district, Idaho. He was a guest at the dinner given in honor of Philip N. Moore at Wallace on Oct. 18.

L. Douglass Anderson, chief engineer of the United States Smelting, Refining & Mining Co., is at present at the company's Real del Monte properties at Pachuca, Hidalgo, Mexico, but will be at his Salt Lake City headquarters early in November.

J. MacIntosh Bell, managing director of the Canadian Lorrain mine, at Silver Centre, Ontario, reports that the mill being built there will be completed by the first week in November, and the mine will then take its place among the regular producing silver mines of Ontario.

William B. Taber

William B. Taber, long identified with the non-metallic industry of the South, and at present supervising engineer and manager of the Flaketown graphite mines of the Flaketown Graphite Co., Mountain Creek, Ala., is installing new flotation machines in the company's concentration plant. He will refine graphite on electrostatic machines of modified design.

James F. McCarthy, of Wallace, Idaho, president and general manager of the Hecla Mining Co., is in southern Idaho, where the company is developing several mining properties held under option. From there he will proceed to Milwaukee to attend a meeting of the directors of the company.

C. Clyde Drew, of C. C. Drew & Co., Montreal, has been elected vice-president of the Montreal Rouyn Mines, Ltd. Mr. Drew, who is well known in mining circles, has interested himself in Quebec mining since the discovery of the field. He has recently been elected president of the Extension Mining Co., Ltd.

Philip N. Moore, of St. Louis, visited the Coeur d'Alene district, Idaho, after attending the recent meeting of American and Canadian engineers in Spokane. Mr. Moore was the guest of honor at a dinner in Wallace which was attended by a large number of mine executives and engineers of the district and by a number of visitors from other states.

A. France, of Liége, Belgium, inventor of the Rheolaveur process of mineral washing, has been visiting plants constructed in accordance with his designs in the anthracite region of the United States. He returned to Belgium, Oct. 23, having completed the sale of his American rights to the American Rheolaveur Co., which from now on is permitted to beneficiate, by that process, all minerals, and not coal alone, as heretofore.

Obituary

Marcus L. Hewett, president of the Basin-Montana Development Co., of Basin, Mont., died recently in Scranton, Pa. Mr. Hewett was a pioneer of the Coeur d'Alene district, and for several years was engaged in mining on Nine Mile.

Aubrey C. Bibb, general foreman of the Nevada Consolidated Copper Co.'s Chino mines, at Santa Rita, N. M., was instantly killed in a rock slide on Oct. 18. Bibb was working with a steam-shovel crew. He was caught by the falling rock and knocked under the shovel, and his neck was broken.

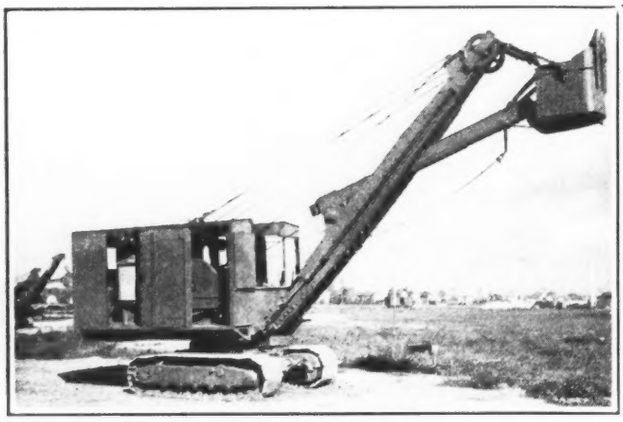
William E. Youle, a pioneer oil driller in the California fields, died recently at Los Angeles. Mr. Youle came to California in 1879 and drilled the first well in the Muddy Gulch field in Santa Clara County. He was also identified with the early development of the Puente field.

Fred Tuff, of Houston, Tex., superintendent of the Humphrey Oil Corporation, and former chief of the petroleum division of the Bureau of Mines, and **T. Chambless,** a field employee, were burned to death on Oct. 24 in a fire which originated from a spark caused by friction in an oil well in the Sour Lake oil fields.

John Hoatson, brother of **Thomas Hoatson,** director of the Calumet & Arizona Mining Co., died recently in Los Angeles. John Hoatson was a mine foreman for the C. & A. in Bisbee for a long period until he moved to the Coast several years ago. He retired some time ago and had been making Los Angeles his home. The Hoatson shaft of the C. & A. was named after the late "Captain Jim" Hoatson, a brother of the decedent, who was also a well-known mining man in the district many years ago.

William Bethune, well known as a mining engineer and prospector in Australia, died recently in that country. Mr. Bethune was born near Adelaide, South Australia, in 1868. He was trained as an engineer, but later devoted his attention to mining. He spent much time in the early days on the fields of Kalgoorlie (Western Australia), Broken Hill (New South Wales), and Zeehan (Tasmania). He carried out prospecting work throughout the whole of the Australian Commonwealth, as well as in the East, and his reports led to the formation of many of the companies now successfully operating there. Mr. Bethune was reputed to be a very expert boring engineer, and was for a considerable period chief boring engineer for the Tonga Harbour Co.

New Machinery and Inventions



Gasoline or electric shovel in 1¼-yd. size with caterpillar tread. This machine has an all-gear drive and facility in steering from the upper body

New 1¼-Yd. Gasoline or Electric Shovel Introduced

Guided by the results of the introduction of its 1-yd. gasoline and electric shovels, the Osgood Company, of Marion, Ohio, has designed a 1¼-yd. gasoline or electric shovel to meet the increasing demand for a larger machine.

With economical operation which is characteristic of gasoline or electric power has been combined in this machine a simple design, many refinements adding to its efficiency and to its structural strength. The machine is also designed for efficient service as a crane, with hook block or clamshell bucket, and as a dragline excavator, without necessitating any changes or additions to the operating machinery. The only change is the booms and buckets. It is built up almost entirely of open hearth and alloy steel castings, and little cast iron or structural steel enters into its construction.

Only four friction clutches are used in the usual operation of the machine. These are of the outside contracting-band type and are easily adjusted and renewed. Gearing is by plain spur gears, the number being reduced to a minimum by careful design. All upper body gears have teeth machine-cut from the solid.

The shovel is mounted as standard on an inclosed gear-driven continuous tread truck of simple and rugged design. The chief features of construction are the all-gear drive with inclosed gears running in heavy oil; large supporting area of tread belts, steering from the upper body, in any position, with ability to turn gradually or on machines own center axis; and an underside clearance of 12 in.

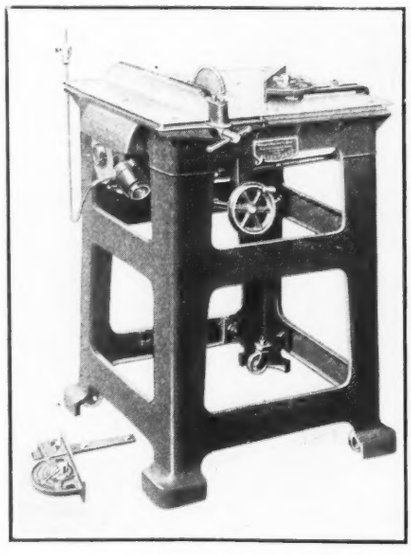
The shovel crowding is accomplished by a simple wire-rope mechanism, which is self-adjusting to all boom angles and involves no chains or other complications.

Among other features of this machine are the manganese front dipper; combination oak and steel boom and handle; "Special Osgood" six-cylinder gasoline engine with accessories, including self-starter as standard; two-finger control of the drum clutches through the "Osgood Servo" mechanism; an all-steel house with inclosed front, and the combination gasoline tank and counterweight.

The combination gasoline tank and counterweight is made of cast iron, the center being made hollow. It is built into the upper body and becomes an integral part of the machine, adding strength and solidity to the deck structure. This casting is made in one piece, with very thick walls, which insures freedom from leakage caused by buckling or rusting and also from the possibility of catching fire. The capacity of tank is 75 gal.

A Portable Circular Saw

When the portable floor type of universal circular saw was developed it combined the advantages of the portable bench machine with those of the self-contained floor type. Such a unit, shown in the accompanying illustration, will doubtless fill many needs around the mines. It can be used in the shop as a floor type machine, yet, being portable, it can be moved to construction jobs. The motor and working parts are built into the upper section together with the table and fences, the top portion being a complete self-contained bench saw when lifted off the regular stand.



A saw for shop and field

This machine can be moved to the work. It is heavy enough to cut fairly heavy planking yet light enough to be taken from the shop to the construction job in the field.

J. D. Wallace & Co., Chicago, Ill., is the manufacturer. The table is one piece of finished steel, 25 in. square, fitted with a removable throat piece so that special saws, dado and cope heads requiring a wider throat opening may be used. This machine is designed to handle small work accurately, safely and quickly. It is sufficiently powerful to cut 2¾ in. stock. With the various adjustments it will cut compound miters and by means of a special dado head grooves ¾ in. wide by 1 in. deep, moldings and the like.

Mycalex—A New and Unique Insulating Material

A new type of insulating material which is being used by the General Electric Co. for the production of radio high-frequency insulators not only solves the problem of an improved insulator for such high frequencies as are encountered in radio work but also solves a problem in more efficient utilization of materials. The new insulation, known as Mycalex, is a composition of ground mica and lead borate.

Mica previously presented a difficult problem because of the enormous amount of waste. Obtained in Canada and India in large sheets, there was considerable waste at the mines, it being estimated that only 5 per cent of the material taken from the mines could be used. In manufacturing, there were further wastes of small pieces of mica, but some years ago it was found that these mica flakes, mixed with a binding material and compressed under heat, made very good insulation. Such sheets of prepared mica are used by the General Electric Co. in many manufacturing processes. And now a product has been developed which utilizes mica particles, so that even more of the mineral is used.

The new material has better insulating properties than has porcelain, and several applications for it have been developed by engineers of the company. The substance, light gray in color and with a metallic ring, is being used in the manufacture of bases for radio transmitter tubes, for aërial insulators in high-frequency work, and for numerous similar applications.

Chief among its characteristics are that metal parts may be inserted or combined with Mycalex during the process of molding; and although a hard and stone-like product, it can be subjected to ordinary machining methods.

Mycalex is softened or made plastic by heating to a dull red, and the plastic mass is then formed into the desired shape by compression in steel molds. The substance is not as heat-resistant as porcelain or mica, but tests show that it is far superior in this respect to the ordinary molded insulations made with phenolic resin, shellac, gums, pitches, and similar materials.

The fact that metal parts can be combined with this new insulator during the molding process assures a tighter and stronger combination. As a rule,

metal inserts cannot be imbedded in ceramic products during the process of manufacture. This is especially true of porcelain because of the considerable shrinkage and the high temperature, which causes melting or slagging of metal parts.

Not only has it better electrical properties than porcelain, but it is stronger mechanically except under compression. Although it can be drilled, filed, sawed, polished, and similarly treated by usual machining methods, it is necessary in some instances to use special tools, since the wear, when working with Mycalex, is greater than when cutting metals.

The new material has been recommended for use where the requirements demand an insulating material of high mechanical strength, dielectric strength and insulating resistance, low losses with high frequencies, heat resistance beyond the ordinary range of molded or sheet materials, and compact construction with metal inserts securely molded in place.

Deep Well Pump Adapted to Sump Work

The "Axiflo" type of pump brought out about three years ago by the Worthington Pump & Machinery Corp., 115 Broadway, New York City, has recently been made adaptable to sump-pump service.

The pump consists essentially of a driving head supporting a drop pipe within which is a vertical shaft carrying one or more "Axiflo" open-type impellers and guide vanes. In operation the impellers force the water vertically through the drop pipe, thus eliminating the necessity of using the usual separate discharge pipe. As no shrouds or wearing rings are used and no close clearances required, the pump is particularly adaptable to sump service.

On the top of the driving head is mounted a vertical motor, the thrust bearing of which carries the pump thrust load. This motor is automatically controlled by means of a float switch.

Portable Compressors Now Motor-Driven

A new line of portable air compressors operated by electric motors has been recently introduced by the Sullivan Machinery Co., Chicago, Ill. At present two sizes are available; namely, 103-ft. and 206-ft. of free air per minute, with 20 and 40 hp. motors respectively, direct-connected to the compressors. These outfits utilize the same compressor units as the gasoline-engine-driven units, with which the public is familiar.

The WK-322 compressor, the smaller of the two, is equipped with a two-cylinder vertical compressor, and the WK-324, the larger, has the four-cylinder 90-deg. or V type, balanced compressor, which is said to have proven successful in the Sullivan 220- and 320-ft. gasoline-engine-driven types.

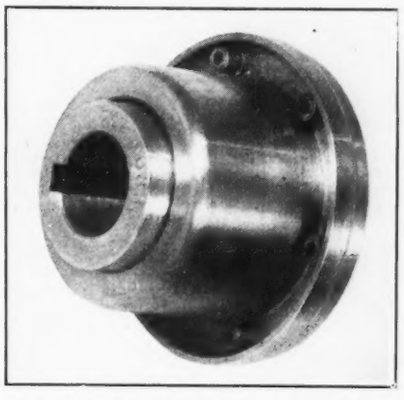
The smaller compressor may be had mounted on steel wheels, a trailer truck, on skids, or on a one-ton Ford truck. The larger may be had on wheels, skids or trailer truck.

These machines have the compressor mounted at one end of the cast-steel truck frame, with the electric motor close to the other end. The air receiver is suspended horizontally outside of the canopy top support, at the compressor end, with a circulating water tank above it. Water is circulated through the jackets by a small centrifugal pump driven by a pulley, on the drive shaft between motor and compressor. Rheostat and starting equipment are mounted on top of the motor casing, motors are of standard make, either d.c. or a.c.

The compressors are equipped with Protectomotor air filters. The truck frame is a heavy and substantial one-piece steel casting. The trailer mounting for both machines consists of special axles with rubber-tired steel wheels equipped with Timken roller bearings.

A New Flexible Coupling

Something new in flexible couplings has been introduced by the Falk Corporation, Milwaukee, Wis. Simplicity of construction is said to mark the new product. A tempered-steel spring in segments, two-flanged steel disks with slots into which the spring fits, and a steel shell constitute the parts. The shell protects the coupling parts from dirt, acts as a simple fastener for the spring, and as a container for the



This flexible coupling is simply made

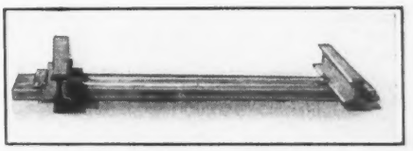
lubricant. All parts are of steel and are positively lubricated.

These couplings are precision made to fine limits. Their construction, it is stated, provides for disconnection of shafts coupled, without disturbing either machine. Alignment is reduced to the simplest operation, demanding only a short strait-edge and an ordinary set of feelers. The couplings are made in standard sizes, from ½ hp. to 20,000 hp. at 100 r.p.m.

Steel Tie Now Available for Main Line Service

Steel mine ties for room-track service have proved successful on account of their long life and the saving in height they make possible. The West Virginia Rail Co. of Huntington, W. Va., has designed and is now manufacturing the steel mine tie for main-line use shown in the accompanying photo.

These ties utilize a bolted clip on one side of the rail and a riveted clip extending the full width of the tie on the other side. The bolted clips have a dependent lug fitting against the edge of a rectangular hole in the tie, also a square shoulder abutting the rail flange, thus taking all thrust and preventing any sidewise motion of the rails. The clips are placed in these positions so that this type of tie can be put into existing track without springing the rails.



An easily installed steel tie

The stationary clip is of steel, rolled to exact shape, having a square-flange bearing shoulder extending the full width of the tie. This affords maximum stiffness to the tie while at the same time giving a minimum of weight.

Tee-head bolts permit the clips being applied from the top after the ties have been put in place. These ties are suitable for use with rails up to 70 lb. in weight.

A Surveyor's Manual

A new edition of the C. L. Berger & Sons, Inc., Manual has been issued by the company to mark the beginning of the second half century since the firm was started. The original manual was written by Christian L. Berger, who founded the business in 1871, and for the purpose of answering the many questions and problems arising in the use of surveying and engineering instruments in the field. The subject matter has been carefully prepared and brought to date to make it confirm to the most recent practice in the construction and use of surveying and engineering instruments. The manual has been written in simple language, and no attempt has been made to make it a textbook.

The purpose of this edition is to place in the hands of users of Berger instruments detailed information about the construction, care, and adjustment of surveying instruments, such as would scarcely find place in a textbook. No attempt has been made to treat the subjects in a perfectly logical order.

The book contains 342 pages and numerous illustrations. Binding, paper and printing are excellent. It is sold at $2 per copy. The company's address is Boston, Mass.

Trade Catalogs

Sectionalized Machinery — Bulletin 100 of the Straub Manufacturing Co., 507 Chestnut St., Oakland, Calif., covers the all-steel sectionalized water-tube boiler featured by that company (previously described in these pages). Bulletin 87 is devoted to stamp mills that have been designed so that no part is too heavy for mule-back transportation. A third bulletin, No. 262, issued by the company, covers "Overbuilt" sectionalized jaw crushers.

Lubrication— A booklet of instructions for lubricating Climax Trustworthy engines has been issued by the Climax Engineering Co., of Clinton, Iowa.

The Market Report

Metal Prices Decline

Copper Back to 14c., Lead to 8.25c., and Zinc to 7.225c.

New York, Oct. 27, 1926—With the exception of silver and tin, prices for each of the major non-ferrous metals are lower today than they were a week ago. Since last Friday silver has improved each day, closing at 53¾c. per ounce. The decline in copper, lead, and zinc has been small, as has also been the volume of business. Quicksilver again advanced, whereas antimony is slightly weaker.

Copper Prices Cut to Get Business

Only two sellers participated in any large extent in the small business done in domestic copper during the week ending today. Inquiry has been next to nothing, and the business has resulted from solicitation on the part of sellers, who have found it necessary to cut prices to induce buying. With the exception of two transactions, nothing has been done under 14c., and in each of these instances the extent of the shading was very small. Last Thursday and Friday 14.05c. delivered in Connecticut was the prevailing price, and some sales were made at that figure on Monday and Tuesday. In the Middle West small sales were made at 14.17c. Copper Exporters, Inc., has maintained its foreign price at 14.40c. c.i.f., and all of the members report business at this figure. Germany is the leading buyer, but France, Italy, and England all have been in the market. In the "outside" market this price has been shaded from 2 to 5 points, though in some instances dealers have obtained the full 14.40c., as they have had preference over the member agencies. How much of this copper is to be had is uncertain, but the general opinion is that most of it should be in consumption within a month or two. Indications are not wanting that there is good business behind the domestic market, but consumers feel that they have the upper hand and are jockeying for the lowest possible prices. Producers, on the other hand, are, in general, not overstocked with metal, and several of them are entirely out of the market, with their price nominally 14.125c. delivered in Connecticut. One source of optimism is the improvement in the European outlook.

Daily Prices of Metals

Oct.	Copper N. Y. net refinery	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
21	13.825	67.50	69.125	8.325@8.35	8.00	7.275
22	13.825	67.50	69.50	8.30@8.35	8.00	7.275
23	13.775	67.50	69.50	8.30@8.35	8.00	7.275
25	13.775	67.50	69.50	8.25@8.30	8.00	7.25
26	13.775	67.00	69.00	8.25	8.00	7.20@7.225
27	13.75	66.75	69.50	8.25	8.00	7.225
Av.	13.788	67.292	69.354	8.294	8.000	7.252

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

London

Oct.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
21	58⅜	59¼	66½	309¼	303½	30⅜	30⅜	34⅛	34
22	58½	59¼	66½	310	304½	30 11/16	30⅝	34 5/16	34⅛
25	58⅜	59¼	66½	310½	304¾	30½	30½	34⅛	34 1/16
26	58⅜	59	66½	306	301½	30¼	30 3/16	33 13/16	33 13/16
27	58½	59⅜	66½	306½	302¼	30⅜	30⅝	34	34

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Oct.	Sterling Exchange "Checks"	Silver		Gold London	Oct.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
21	4 84⅜	54⅛	24⅞	84s11½d	25	4 84¼	52⅞	24 9/16	84s11½d
22	4 84¼	51⅞	24⅜	84s11½d	26	4 84⅛	53¼	24 13/16	84s11¼d
23	4 84¼	52⅛	24⅜	.....	27	4 84¼	53¾	24 15/16	84s11½d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command one-half cent premium.

Lead Slightly Easier

On Monday, Oct. 25, the American Smelting & Refining Co. reduced its contract price for New York lead from 8.35 to 8.25c., some shading having been reported by other sellers on Friday and Saturday, though it is probable that no large tonnage was involved. No further reduction, however, was made in the St. Louis market, practically all sales having been made at 8c. flat, which was the market last Wednesday. An occasional carload may have been sold at 7.95c., but the business was not sufficient to establish the market at that level, and the principal producers continue disinclined to shade prices below 8c.

Sales have been considerably less than they were for last week, though a moderate business has been done by most sellers. Shipment has been about equally divided between prompt and November, with one or two orders extending into December. It is felt that a large amount of November lead still remains to be bought. Foreign demand continues unsatisfactory, though followers of the market think the long decline in London has about run its course.

Zinc Prices Lower

The week has been a dull one in the zinc market, with prices slightly lower since Monday. Both galvanizers and

brass melters have bought sparingly, almost entirely for November delivery. That stocks in the hands of consumers are scant is indicated by the demand for prompt shipment and requests on the part of some to ship immediately on November contracts. The premium for Brass Special continues narrow, 5 points being the outside margin. High-grade is quoted at 9c. to 9.25c., New York City.

Tin Continues Under 70c.

Prompt tin continues scarce, though the market seems to be established for the time being under 70c., today's price for spot being 69½c. Consumers have bought moderate tonnages, largely for early delivery from specified vessels. Spot tin of both Straits and 99 per cent grade, but especially the latter, has been virtually unobtainable most of the time. January tin has sold for about 2c. per lb. less than prompt.

Silver Shows Improvement

A sharp advance in the price of silver occurred on Oct. 21, attributable to buying on the part of both India and China, but a reversal of the latter's position on the following day caused a sharp break in London, which was more than reflected in the local market, New York quotations declining 2¼c. overnight. Since that date moderate buying by China and India has occasioned a gradual improvement, and the market closes steady.

Mexican Dollars (Old Mexican Pesos) Oct. 21st, 41¼c.; 22d, 39⅜c.; 23d, 39⅝c.; 25th, 40¼c.; 26th, 40⅜c.; 27th, 40⅜c.

Francs and Lire Higher

Francs and lire are somewhat improved over a week ago, whereas sterling has declined close to the gold shipping point. Closing cable quotations on Tuesday, Oct. 26, were: francs, 3.07c.; lire, 4.4525c.; and marks, 23.775c. Canadian dollars, ⅛ per cent premium.

Other Metals

Quotations cover large wholesale lots unless otherwise specified. London prices are according to latest mail advices.

Aluminum—Both 98 and 99 per cent grades quoted at 27c. per lb. London, £107 per long ton for domestic metal.

Antimony—Per lb., duty paid, New York: Chinese brands, spot, 14¼@13¾c.; November 13⅞c.; December 13⅞c. Cookson's "C" grade, 17¾@18c. Weakened Monday and Tuesday. Needle and oxide nominally unchanged from quotations in the Oct. 9 issue.

Bismuth—Per lb., New York, in ton lots, $2.70@$2.75. London, 10s.

Cadmium—Per lb., New York, 60c. London. 1s. 10½d. for American metal; 1s. 9d. for Australian metal.

Iridium—Per oz., $120@$125 for 98 @99 per cent sponge and powder. Firm. London, £32½ in iridio-platinum; £17@ £25 for sponge and powder.

Nickel — Per lb., ingot, 35c.; shot, 36c.; electrolytic, 39c. (99.75 per cent grade). London, £170@£175 per long ton according to quantity. Dull.

Osmium—Per oz., $60@$65. London, £16@£19.

Palladium—Per oz., $68@$70. Pure metal as a constituent of crude platinum, $55@$60 per oz. London £11@ £13, nominal.

Platinum — Official price on refined metal, $112 per oz. Open market cash sales of large lots, $107. Pure metal as a constituent of crude platinum, $106.

London, £23 per oz. for refined and £20½ for crude.

Quicksilver — Per 75-lb. flask, $98 @$99. San Francisco wires $97; steady. London, £16½.

Ruthenium—Per oz., nominally $50@ $60. London, £7½@£11.

The prices of **Cobalt, Germanium Oxide, Lithium, Magnesium, Molybdenum, Monel Metal, Radium, Rhodium, Selenium, Tantalum, Tellurium, Thallium, Tungsten,** and **Zirconium** are unchanged from the issue of Oct. 9.

Metallic Ores

Manganese Ore—Per long ton unit of Mn, c.i.f. North Atlantic ports, minimum 47 per cent Mn, 28@30c. Caucasian (washed), 53@55 per cent, 32c., nominal. The market is purely nominal with no current sales.

Chemical grades, powdered, coarse or fine, 82@87 per cent MnO_2, Brazilian and Cuban, $70@$80 per ton in carloads.

Tungsten Ore — Per unit of WO_3, N. Y.: Wolframite, $10.50@$10.75; Western scheelite, $11@$11.25. Fair activity.

Chrome, Iron, Molybdenum, Tantalum, Uranium, and **Vanadium Ores** are unchanged from quotations in the Oct. 9 issue.

Zinc Blende Lower—Lead Ore Unchanged

Joplin, Mo., Oct. 23, 1926

Zinc Blende

High	$52.30
Premium blende, basis 60 per cent zinc	$49.00@ 50.00
Prime Western, basis 60 per cent zinc	48.00
Fines and slimes, 60 per cent zinc	47.00@ 45.00
Average settling price, all zinc	47.79

Galena

High	$108.50
Basis 80 per cent lead	102.50
Average settling price, all lead	106.99

Shipments for the week: Blende, 18,-131; calamine, 163; lead, 2,815 tons. Value, all ores the week, $1,173,260.

With another cut in the price of zinc concentrate, buyers went 3,000 tons short of the purchase last week, and that was a quantity that practically represents their needs. With 17,000 tons reported purchased last week, shipment of more than 18,000 tons was made this week. At present purchases are being made only as the concentrate is needed for shipment the following week; therefore the ore in the bins in excess of the tonnage purchased today is the property of the producers, a number of whom declined to sell on today's offerings.

Production of lead is estimated around 2,500 tons per week, with a bin stock of 11.000 tons, approximately 8,-300 tons of which is not sold.

Platteville, Wis., Oct. 23, 1926

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$51.75
Lead Ore	
Lead, basis 80 per cent lead	$105.50

Shipments for the week: Blende, 1,188 tons; lead, 80 tons. Shipments for the year: Blende, 45,212; lead, 1,686 tons. Shipments for the week to separating plants, 1,761 tons blende.

Non-Metallic Minerals

Amblygonite, Asbestos, Barytes, Bauxite, Borax, Celestite, Chalk, China Clay, Diatomite, Emery, Feldspar, Fuller's Earth, Fluorspar, Garnet, Gilsonite, Graphite, Greensand, Gypsum, Ilmenite, Iron Oxide, Lepidolite, Limestone, Magnesite, Mica, Monazite, Ocher, Phosphate, Potash, Pumice, Pyrites, Quartz Rock Crystals, Silica, Spodumene, Sulphur, Talc, Tripoli, and **Zircon** are unchanged from prices in the Oct. 9 issue.

Mineral Products

Arsenious Oxide (White Arsenic)— 3½c. per lb. for deliveries up to July, 1927. London, £15¾@£16¼ per long ton.

Calcium Molybdate, Copper Sulphate, Sodium Nitrate, Sodium Sulphate (Salt Cake), and **Zinc Oxide** are unchanged from prices in the Oct. 9 issue.

Ferro-Alloys

Ferromanganese — Domestic, 78@82 per cent, $90@$92 per long ton, furnace, prompt and future. Spiegeleisen unchanged from Oct. 9 issue.

Ferrocerium, Ferrochrome, Ferrophosphorus, Ferrosilicon, Ferrotitanium, Ferrotungsten, Ferro-uranium and **Ferrovanadium** are unchanged from prices in the Oct. 9 issue.

Metal Products

Rolled Copper — Sheets, 22¼c.; wire, 16c. per lb., f.o.b. mill.

Lead Sheets—Full rolled, 12c. per lb.; clipped, 12¼c.

Nickel Silver—29¼c. per lb. for 18 per cent nickel Grade A sheets.

Yellow (Muntz) Metal — Dimension sheets, 19¾c. per lb.; rods, 16¾c. per lb.

Zinc Sheets — 11¾c. per lb., f.o.b. works.

Refractories

Fireclay Brick, Chrome Brick, Magnesite Brick, Silica Brick and **Zirkite** are unchanged from quotations in the Oct. 9 issue.

Steel Trade Shows Seasonal Decline—Pig Iron and Coke High and Firm

Pittsburgh, Oct. 26, 1926

A marked downturn in the steel requirements of various consuming lines is now evident, not accompanied by any conspicuous increases. At present there is no disposition whatever to anticipate requirements.

Pig Iron—With coke scarce, Valley furnaces have marked up prices 50c. in the face of continued light buying. Bessemer, $19.50; basic, $18; foundry, $18.50, f.o.b. Valley furnaces.

Connellsville Coke — Heavy demand for coal at sharply increasing prices impairs coke offerings. Prices are up and would advance further if there were even a moderate demand. Spot furnace coke, $4; spot foundry, $4.75@$5.50.

Texas Gulf Sulphur Earned $2,531,468 in Third Quarter

For the three months ended Sept. 30, 1926, the Texas Gulf Sulphur Co. made net earnings of $2,531,468. With this amount added, its total surplus and reserve for depletion at Sept. 30, 1926, was $8,482,286, after having paid a dividend of $1,905,000 on Sept. 15, 1926. During these three months the company also increased its reserves, including reserve for depreciation and for unpaid federal taxes (accrued), by $520,451, making the total of these reserves $7,423,814 at Sept. 30, 1926.

Howe Sound Earnings Higher

The report of the Howe Sound Co. for the quarter ended Sept. 30, 1926, shows production as given below from the operation of the company's Britannia mine, in British Columbia, and the Calera and the El Potosi mines, in Mexico:

	Gold, Oz.	Silver, Oz.	Copper, Lb.	Lead, Lb.	Zinc, Lb.
Third quarter	3,090	678,630	7,980,470	15,133,821	11,890,863
Second quarter	3,084	597,355	9,016,120	14,767,834	13,400,762

The financial statement shows:

	Third Quarter	Second Quarter
Value of metals produced	$3,615,052.05	$3,531,231.60
Operating costs	2,609,051.01	2,534,822.45
Operating income	1,006,001.04	996,409.15
Miscellaneous income	60,368.17	43,658.86
Total income	1,066,369.21	1,040,068.01
Less depreciation	190,673.84	194,352.23
Net income	$875,695.37	$845,715.78

Sharpe Looks for Firmer Zinc Prices

A. J. M. Sharpe, honorary foreign correspondent of the American Zinc Institute, in his review of the zinc industry on Oct. 1 says that the coal strike in Great Britain is proving a much longer-drawn-out affair than any one anticipated. With the coming of winter there is a general desire on the part of the miners' leaders to reach an agreement, but, as they lack any policy whatever, the ways and means for reaching a settlement of the dispute are difficult to find. I stress this coal strike because of its effect on the zinc situation so far as the United Kingdom is concerned. In the first place, it has entirely closed down British zinc smelters, and even when the dispute is over it will be another month or so before the zinc smelters are operating. Second, there is the effect the coal stoppage has had on the actual consumption of zinc. At the outset it almost paralyzed consuming industries, but when once it was apparent that the struggle would be a long one the galvanizers and other large users of zinc made arrangements to carry on as far as possible with the aid of foreign fuel, and in some cases foreign semi-manufactured materials. That the efforts of British manufacturers to carry on in such difficult circumstances have been successful is eloquently testified by the importations of slab zinc, which are really little below those of the few months preceding the strike. Consumption has, of course, suffered, on a scale equal to the erstwhile production of 4,000 tons monthly in the United Kingdom.

The Belgian output, Mr. Sharpe says, is fully maintained and production elsewhere is such as to call for no special comment. Consumption in Europe is satisfactory, having regard to the state of political and industrial affairs. The rolling mills on the Continent are particularly busy and continue to be booked up for three months ahead.

Stocks in Europe are about as low as they can be, so that technically the zinc situation there is quite sound. Reviewing the position from the market angle, it will be seen that there is no scope for any material fall in the selling price; on the other hand, the chances are more in favor of an advance in the quotation following the termination of the British coal strike and the consequent moderate increase in consumption.

Mr. Sharpe estimates stocks of metal as at Oct. 1 as follows:

	Metric Tons		Metric Tons
United States	14,200	France	1,000
Canada	2,200	Great Britain	1,200
Australia, including unsold shipments afloat	2,200	Scandinavia	200
		Far East	500
Germany and Poland	5,000	Elsewhere	1,500
Belgium	2,100	Total	30,100

Few Changes in October Dividend List

The following dividends were paid by American mining and metallurgical companies during October:

Companies in the United States	Situation	Per Share		Total
Aluminum Co. of America, pfd	Various	$1.50	Q	$1,104,570
Cleveland-Cliffs Iron	Mich.	1.00	Q	400,000
Consolidated Lead & Zinc "A"	Kans.	0.625	Q	109,375
Cresson Consolidated Gold	Colo.	0.10	Q	122,000
Eagle Picher Lead, pfd., l,z	Okla., Mo.	1.50	Q	12,829
Gladstone Mountain, l	Wash.	0.01	MX	13,219
Homestake Mining, g	S. D.	0.50	M	125,580
Inland Steel, pfd	Minn.	1.75	Q	175,000
Inspiration Consol. Copper	Ariz.	0.50	Q	590,983
Kennecott Copper	Alaska	1.00	Q	4,474,281
Magma Copper, c,s	Ariz.	0.75	Q	306,116
Newmont Mining, h	Various	0.60	Q	258,000
Nichols Copper, pfd	N. Y.	1.75	Q	40,434
Park-Utah Consolidated, s,l,z	Utah	0.15	Q	315,025
Phelps Dodge, c	Various	1.50	Q	750,000
Plutus Mining, s,l	Utah	0.15	Q	149,932
Portland Gold	Colo.	0.02	Q	60,000
Republic Iron & Steel, pfd	Various	1.75	Q	437,500
Silver King Coalition, s,l	Utah	0.25	Q	304,025
Sloss-Sheffield Steel & Iron, pfd	Ala.	1.75	Q	117,250
Tonopah Mining, s,g	Nev.	0.075	SA	75,000
U. S. Smelting, Ref. & Mng., s,l	Various	0.875	Q	307,225
U. S. Smelting, Ref. & Mng., pfd	Various	0.875	Q	425,556
Utah-Apex, l,c,s,g	Utah	0.25	Q	152,050
Companies in other countries				
Ahumada Lead, l,s	Chihuahua	0.25	Q	298,004
Belmont Surf Inlet, g,c	B. C.	0.05		152,000
Camp Bird, h	Mexico	8 per cent		
Dome, g	Ont.	0.50	Q	500,000
Erupcion, l,s	Chihuahua	0.10	Q	125,000
Hollinger Consol. Gold	Ont.	0.10	4 wks.	492,000
Howe Sound, c,l,s	B. C., Mex.	1.00	Q	496,038
Kerr Lake, s,g	Ont.	0.125	SA	75,000
Lucky Tiger-Combination, g,s	Sonora	0.07	M	50,074
N. Y. & Honduras Rosario, g,s	Honduras	0.50	Q	100,000
Nipissing, s	Ont.	0.15	Q	180,000
Premier Gold, s,g	B. C.	0.08	Q	400,000
Santa Gertrudis, g,s	Hidalgo	9d.		£56,250
Silversmith, s,l,z	B. C.	$0.02	Q	$50,000
Whitewater, pfd., l,z	B. C.	0.15	SA	15,000
Wright-Hargreaves, g	Ont.	0.075	Q	206,250
Total				$13,898,316

l, lead; z, zinc; g, gold; c, copper; s, silver; h, holding; Q, quarterly; M, monthly; X, includes ½c. extra; SA, semi-annually.

Few changes were made in the October distributions of the companies on a regular dividend basis. Howe Sound, however, increased its dividends from 75c. to $1 per quarter, and expects to continue at that rate. Lucky Tiger's earnings for September dropped considerably, owing to the low price of silver, having been $47,258 compared with $56,877 in August. The October dividend, therefore, was less than the September, and presumably the October, earnings. Utah-Apex notified stockholders that the present dividend was paid out of reserves and that 1927 dividends would be paid only as earned, it being the desire of the company to maintain an ore and cash reserve of at least $1,000,000.

The total dividends paid were considerably less than in July, on account of several semi-annual distributions being made in that month, but were about $3,500,000 greater than a year ago.

Dividend Yields

The dividend yields on the stocks of the above companies that are on a regular dividend basis, based on the September distributions unless otherwise noted, and on recent market prices, are as follows:

Company	Per Cent Annual Yield	Company	Per Cent Annual Yield
Erupcion	35.5	Lucky Tiger	10.5
Kerr Lake	30.5	Howe Sound	9.6
Plutus	30.0	Magma Copper	8.3
Gladstone (a)	24.1	U. S. Smelting, pfd	7.9
Silversmith	21.6	Inspiration	7.7
Dome	21.0	Republic I. & S., pfd	7.3
Utah-Apex	20.0	Hollinger	6.9
Portland	18.6	Sloss-Sheffield, pfd	6.7
N. Y. & H. Rosario	18.6	Kennecott	6.6
Cresson	16.8	Inland Steel, pfd	6.3
Premier	16.0	Aluminum, pfd	5.8
Ahumada	13.8	Eagle-Picher, pfd	5.5
Silver King C	13.2	Cleveland-Cliffs	4.9
Nipissing	11.7	Phelps Dodge	4.6
U. S. Smelting	11.3	Tonopah	4.1
Park-Utah	11.2	Wright-Hargreaves	3.6
Homestake (b)	11.1	Newmont	3.2
Consol. L & Z	10.6		
Average			12.0

(a) Based on 7c. per year. (b) Based on $7 per year.

Current Prices of Mining Supplies

Rise and Fall of the Market

ASIDE from slight fluctuations in prices of track supplies and hollow building tile, as well as a rise of 10c. per 100 lb. in steel sheets, changes since September have been in a downward direction. The principal items affected were c.-i. pipe, pine timbers, nails, manila rope, and paint materials. Long-leaf yellow pine timbers, 3 x 12 to 12 x 12-in., 20 ft. and under, at New York, are just about $1 per M ft. below the May, 1926, level.

SHEETS—Quotations are per 100 lb. in various cities from warehouse also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	St. Louis	Chicago	San Francisco	New York
No. 10	$2.40	$3.60	$3.50	$3.90	$3.89
Black					
No. 24	3.10	4.45	3.95	4 90	4.35
Galvanized					
No. 24	3.95	5.25	4.80	5.65	5.10

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots:

	Pittsburgh Current	Pittsburgh One Year Ago	Birmingham	Chicago
Standard bessemer rails	$43.00	$43.00	$43 00	$43.00
Standard openhearth rails	43.00	43.00	43.00	43.00

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco	Birmingham
Standard spikes, ⅝-in. and larger	$2.80–2.90	$2.70@2.80	$3.55	$3.65	$3.80	$3.00
Track bolts	3.90–4.25	3.90@4.15	4.55	4.40	5.35	3.90
Standard section angle bars	2.75@2.95	2.75	3.40	3.25@3.75	3.60	4.15

STRUCTURAL MATERIAL—Following are base prices in carload lots, f.o.b. mill, Pittsburgh and Birmingham together with quotations per 100 lb. in less than carload lots, from warehouses at places named:

	Pittsburgh, Mill	Birmingham Mill	New York	Dallas	St. Louis	Chicago	San Francisco
Beams, 3 to 15 in.	$2.00	$2.05	$3.34	$4.15	$3.25	$3.10	$3.30
Channel, 3 to 15 in.	2.00	2.10	3.34	4.15	3.25	3.10	3.30
Angles, 3 to 6 in., ¼ in. thick	2.00	2.10	3.34	4.15	3.25	3.10	3.30
Tees, 3 in. and larger	2.00	2.10	3.34	4.15	3.35	3.10	3.30
Plates ¼-inch thick	2.00	2.00	3.34	4.15	3.25	3.10	3.30

WIRE ROPE—Discounts from list price, f.o.b. New York and east of Missouri River, on regular grades of bright and galvanized are as follows:

Cast steel round strand rope	20%
Galvanized steel rigging and guy rope	7½%
Round strand iron and iron tiller	5%
Plow steel round strand rope	35%
Special steel round strand rope	30%
Galvanized iron rigging and guy rope	+12½%

	New York	Cleveland	Chicago
Drill Rod (from list)	60%	55%	50%

WROUGHT PIPE—The following discounts are to jobbers for carload lots at Pittsburgh mill:

	Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
BUTT WELD—	⅛ to 3	62	50½	¼ to 1¼	30	12
LAP WELD—	2½ to 6	59	47½	3 to 6	28	13

STEEL PIPE—From warehouses at the places named the following discounts hold for steel pipe:

	Black New York	Black Chicago	Black St. Louis
2½ to 6 in. lap welded	48%	51%	46%

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York Current	New York One Year Ago	Birmingham	Chicago	St. Louis	San Francisco
6 in. and over	$51.60@52.60	$50.60@51.60	$40.00 base	$48.20	$45.60	$50.00

NUTS—Semi-finished, ⅛x⅛-in., 2c. each. Discount 70% for ⅝-in. and smaller; 65% for ¾-in. and larger. Case hardened, 6c. each, less 50%.

HOLLOW TILE—Price per block in carload lots to contractor for hollow building tile.

	New York Current on Trucks	New York One Year Ago	Chicago	Philadelphia	St. Louis	San Francisco	Perth Amboy N. J., Factory
4x12x12	$0.1027	$0.1027	$0.088	$0.105	$0.0685	$0.108	
8x12x12	.1541	.1541	.119	.....	.09	.156	$0.252*
6x12x12	.1926	.1926	.165	.205	.126	.244	.312†

* 10x12x12; † 12x12x12.

MACHINE BOLTS—½x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%.

LUMBER—Prices of rough Douglas Fir No. 1 common, in carload lots to contractors at yards in San Francisco.

	6-8 and 12 Ft.	10-16-18 and 20 Ft.	22 and 24 Ft.	25 to 32 Ft
3x3 and 4	$26.00	$27.00	$28.00	$31.00
3x6 and 8	26.00	27.00	28.00	31.00
4x4-6 and 8	26.00	27.00	28.00	31.00

Wholesale prices to dealers of long leaf yellow pine. To contractors in New York City, delivered from lighters or cars to job, $5 additional.

	New York 20 Ft. and Under	New York 22-24 Ft.	Chicago Up to 20 Ft., Pine	Chicago Up to 32 Ft., Fir
3x4 to 8x8	$43.00	$44.00	$42.25	$40.50
3x10 to 10x10	50.00	51.00	48.25	40 50
3x12 to 12x12	57.00	58.00	58.25	40.50

Other Cities	8 x 8-In. x 20 Ft. and Under Pine	Fir*	Hemlock	Spruce	12 x 12-In 20 Ft. and Under Pine	Fir*
Boston	$49.50	$48.00†	$50.00	$52.00	$60.00	$58.00†
Cincinnati	37.00	73 00	73.00	85 00	48.00	77.00
Denver	.....	36 25	34.75	34.75	.....	34 75
Minneapolis	42 50	38.25	34.50	.....	45 00	38.25
Kansas City, Mo.	40.25	41 00	.....	.....	55 25	55.25
Philadelphia	54.00	38.00	38.00	45.00	65.00	38.00

*Douglas fir. † Prime.

NAILS—The following quotations are per keg from warehouse:

	Pittsburgh, Mill	Chicago	San Francisco	Dallas	St. Louis	Montreal
Wire	$2.65	$3.05	$3.75	$4.00	$2.83	$4.95
Cut	2.80	....	5.00	5.00	2.93	5.00

PORTLAND CEMENT—Prices to contractors per bbl. in carload lots *without bags*. Cash discount not deducted.

	Current	One Month Ago	One Year Ago
New York, del. by truck	$2.50@2.60	$2.50@2.60	$2.50@2.60
Chicago, f.o.b.	2.10	2.10	2.20
Cleveland, f.o.b.	2.29	2.29	2.39

LIME—Warehouse prices, New York quotes 280 lb. net; Chicago, 180 lb.:

	Hydrated, per Ton Finishing	Hydrated, per Ton Common	Lump, per Barrel Finishing	Lump, per Barrel Common
New York	$18.20	$11.00	$3.50	$2.10@$3.00
Chicago	20.00	18.00	....	1.50

LINSEED OIL—These prices are per gallon:

	New York Currant	New York One Year Ago	Chicago Current	Chicago One Year Ago
Raw in barrel (5 bbl. lots)	$0.87	$1.04	$0.85	$1.05

WHITE AND RED LEAD—In 100-lb. kegs, base price in cents per pound:

	Dry Current	Dry 1 Yr. Ago	In Oil Current	In Oil 1 Yr. Ago
Red	15.25	15.75	16.75	17.25
White	15.25	15.75	15.25	15.75

HOSE—Quotations at New York warehouses:

Fire Protection 50-Ft. Lengths
Underwriters' 2½-in. coupled, single jacket (net) ..... 74c per ft.

Air—Best Grade
¾-in., per ft. ..... 3 ply $0.37½ 4 ply $0.46

Steam—Discounts from List
First grade ..... 30–10% Second grade ..... 40% Third grade ... 40–10%

RUBBER BELTING—List price 6-in., 6 ply, $1.83 per lin.ft. for rubber transmission belting.
Best grade ..... 50% Second grade 50–10%

LEATHER BELTING—List price, 24c. per lin.ft. per inch of width for single ply at New York warehouses:

Grade	Discount from list
Medium	40–5%
Heavy	30–10%

RAWHIDE LACING—For cut, best grade, 50%, 2nd grade, 60%. For laces in sides, best, 41c. per sq.ft.; 2nd, 37c. Semi-tanned: cut, 50%; sides, 41c. per sq.ft.

PACKING—Prices per pound:

Rubber and duck for low-pressure steam, ½ in.	$1.05
Rubber sheet	.60
Rubber sheet, wire insertion	.85

MANILA ROPE—Per lb., ¾-in. and larger, 1,200-ft. coils.

Atlanta	$0.27	New Orleans	$0 23½
New York	.23	Seattle	.24
Chicago	.22½	San Francisco	.22

EXPLOSIVES—Prices per pound of dynamite in small lots:

	Gelatin 40%	Gelatin 60%
New York	$0.265	$0.2875
Minneapolis	.1917	2123
Denver	.2025	2275
Seattle	.165	.19
Cincinnati	.22	.245
New Orleans	.233	.26
San Francisco	.1625	.1925

FLOTATION OIL—
Pine tar, 50 gal. bbl., gross weight 500 lb., f.o.b. New York, carload lots, per gal. $0.46

CHEMICALS—

Zinc dust, 550 lb. casks, f.o.b. works, per lb.	$0.09@.10
Litharge, casks, f.o.b. works, per lb.	.11½
Sodium cyanide, 220 lb. single case lots, f.o.b. works, per lb.	.18@.22
Calcium carbide, in drums, f.o.b. works, per lb.	.05½@.06

Mining Stocks—Week Ended October 23, 1926

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	47⅛	46	47⅛	Oc.16, No.22 Q	0.75
Arcadian Consol.	Boston	*95	*90	*95		
Ariz. Com'l.	Boston	10⅛	10	10	Jy. 16, Jy. 30	0.50
Calaveras	N. Y. Curb			1⅜		
Calumet & Arizona	New York	66⅜	62	64½	Se. 4, Se. 20 Q	1.50
Calumet & Hecla	Boston	66⅛	62½	64½	Au.31, Se.15	0.50
Cerro de Pasco	New York	63⅛	61⅛	62⅛	Jy. 15, Au.2, Q	1.00
Chile Copper	New York	32⅛	31⅛	32	Oc.14, No.1, Q	1.00
Chino	New York	25	25	25		
Con. Coppermines	N. Y. Curb	3	2⅞	3		
Copper Range	Boston	15	14½	14⅜	May, 1925	1.00
Crystal Copper	Boston Curb	*36	*30	*33		
East Butte	Boston	2½	2½	2½	Dec., 1919	0.50
First National	Boston Curb	*5	*5	*5	Feb., 1919	0.15
Franklin	Boston			*40		
Granby Consol.	New York	32⅜	30⅜	31½	May, 1919	1.25
Greene-Cananea	New York	21	20⅛	20⅛	Nov., 1920	0.50
Hancock	Boston			1		
Howe Sound	New York	41⅞	40½	41⅝	Oc.1, Oc.15 Q	1.00
Inspiration Consl.	New York	26	25⅛	25⅞	Se.16, Oc.4, Q	0.50
Iron Cap	Boston Curb	3½	3½	3½		
Isle Royale	Boston	12	11⅛	12	Jn. 1, Jn. 15	0.50
Jerome Verde Dev.	N. Y. Curb			*45		
Kennecott	New York	61⅛	59	60⅜	Sept. 3, Oct. 1 Q	1.00
Lake Copper	Boston	1	*75	1	June, 1925	0.50
Magma Copper	New York	36⅞	35⅜	36½	Oc.1, Oc.15, Q	0.75
Mason Valley	N. Y. Curb	2	2	2		
Mass Consolidated	Boston			*30	Nov., 1917	1.00
Miami Copper	New York	17¼	17	17	No.1, No.15 Q	0.37½
Mohawk	Boston	46	43½	45	Oc.30, De.1 Q	2.00
Mother Lode Coa.	New York	5⅜	5⅛	5⅛	Jn. 15, Jn. 30	0.37½
Nevada Consol.	New York	15⅛	14⅜	15	Oc.14, Nov.16	0.25
New Cornelia	Boston	23¼	22½	23	No.5, No.22 Q	0.50
North Butte	Boston	3	2⅞	3	Oct., 1918	0.25
Ohio Copper	N. Y. Curb	*45	*40	*45	Se. 1, Se. 15	0.05
Old Dominion	Boston	16	15½	16	Dec., 1918	1.00
Phelps Dodge	Open Mar.	†132	†128		Se.25, Oc.2 Q	1.50
Quincy	Boston	18½	18	18	Mar., 1926	1.00
Ray Consolidated	New York	15⅛	15	15⅜	Ap.20, Ap.30	0.25
Ray Hercules	N. Y. Curb			11⅞		
St. Mary's Min. Ld.	Boston	27⅛	27	27⅛	Ap.17, My.18	2.00
Seneca Copper	New York	4⅛	4⅛	4⅛		
Shannon	Boston	*35	*35	*35	Nov., 1917	0.25
Shattuck-Denn	Boston Curb	6	5⅛	5⅛		
Superior & Boston	Boston	*40	*35	*35		
Tenn. C. & C.	New York	11⅛	10⅜	10⅞	Au.31, Se.15, Q	0.25
United Verde Ex.	N. Y. Curb	25	24⅜	25	Oc.16, No.1, Q	0.75
Utah Copper	New York	106	106	106	Se.3, Se.17 Q	1.75
Utah Metal & T.	Boston	1¼	1⅛	1⅛	Dec., 1917	0.30
Victoria	Boston			*50		
Walker Mining	Salt Lake	*66	*66	*66		
NICKEL-COPPER						
Internat. Nickel	New York	35⅛	34¼	35	Se.7, Se.30, Q	0.50
Internat. Nickel, pfd.	New York	...	...	103	Oc.14, No.1,	1.50
LEAD						
Gladstone Mtn.	Spokane	*29½	*29	*29	Oct., 1926	0.01
National Lead	New York	149	145	145	Sept., 1926 Q	2.00
National Lead pfd.	New York			116	No.19, De.15 Q	1.75
St. Joseph Lead	New York	39⅞	38¼	39⅛	Sept., 1926 QX	0.75
ZINC						
Am. Z. L. & S.	New York	6½	6½	6½	May., 1917	1.00
Am. Z. L. & S, pfd.	New York	31	29	29⅜	Nov., 1920	1.50
Butte C. & Z.	New York	5⅛	4⅛	4⅛	De.10, De.24	0.50
Butte & Superior	New York	12⅞	11⅞	12	Se.15, Se.30 Q	0.50
Callahan Zn-Ld	New York	1⅞	1⅜	1⅜	Dec., 1920	0.50
Eagle-Picher	Cincinnati	30¼	29¼	29¼	Au.14, Se.1 Q	0.40
Eagle-Picher, pfd.	Cincinnati			110	Se. 30, Oc. 5 Q	1.50
New Jersey Zn.	N. Y. Curb			191	July 20, Aug. 10 Q	2.00
United Zinc	N. Y. Curb			*70		
Yellow Pine	Los Angeles	*19	*18	*18	Dec. 1925 Q	0.04
GOLD						
Alaska Juneau	New York	1				
Argonaut	Toronto	*62½	*40⅜	*61⅜		
Barry-Hollinger	Toronto	*78½	*70	*78½		
Carson Hill	Boston			21½		
Consol. W. Dome L.	Toronto	*24	*21½	*23½		
Cresson Consol. G.	N. Y. Curb	2 1/16	2⅛	2⅛	Oct, 1926	0.10
Crown Reserve	Toronto	*9	*8	*8	Jan., 1917	0.05
Dome Mines	New York	9⅛	8	9⅛	Se.20, Oc.30, Q	0.50
Golden Center	N. Y. Curb	1⅞	1⅛	1⅜		
Hollinger Consol.	Toronto	18.80	18.60	18.80	Oc.19, No.4 M	0.10
Homestake Mining	New York	63	63	63	Oc.20, Oc.25 M	0.50
Kirkland Lake	Toronto	*97	*85½	*94		
Lake Shore	Toronto	13.80	13.20	13.80	No.1, De.15 Q	0.25
McIntyre-Porcupine	New York	23	22½	23	No.1, De.1 Q	0.25
Newray	Toronto			*42		
Noranda	N. Y. Curb	18¾	18½	18⅜		
Night Hawk Pen.	Toronto	*5	*4	*5		
Rand Mines	New York			41⅜	Au.23-30	Am.Sh.1.52
Teck-Hughes	Toronto	4.92	4.69	4.87	Jy. 15, Au. 2	0.05
Tom Reed	Los Angeles	*45	*40	*44	March, 1926	0.02
Tough-Oakes	Toronto	*53	*40	*52		
United Eastern	N. Y. Curb			*50	July, 1924	0.05
Vipond Cons.	Toronto	1.71	1.55	1.67		
Wright-Hargreaves	Toronto	8.25	8.05	8.20	Se.15, Oc.1 QX	0.07½
Yukon-Alaska Trust	N. Y. Curb			20		
GOLD AND SILVER						
Carnegie Metals	Boston	12⅜	12⅜	12⅜		
Con. Cortez	N. Y. Curb			*5		
Con. Virginia	San Francisco	*6½	*5½	*6½		
Continental Mines	N. Y. Curb			*48		
Dolores Esperanza	N. Y. Curb	*50	*50	*50	July, 1923	0.05
Premier Gold	N. Y. Curb	2	2	2	Se.15, Oc.4 Q	0.08
Tonopah Belmont	N. Y. Curb			2 1/16	Se.15, Oc.1	0.05
Tonopah Extension	N. Y. Curb	*36	*34	*34	Apr. 1925	0.05
Tonopah Mining	N. Y. Curb	3⅜	3⅛	3⅜	Se.30, Oc.27 SA	0.07½
Unity Gold	N. Y. Curb			*30		
West End Consol.	N. Y. Curb			*16	Mar., 1923	0.05
Yukon Gold	N. Y. Curb			*30	June, 1918	0.02

Stock	Exch.	High	Low	Last		Last Div.
SILVER						
Alvarado	N. Y. Curb			1	Oct., 1920	0.50
Beaver Consol.	Toronto	*76	*66	*69½	May. 1920	0.03
Castle-Trethewey	Toronto	1.10	*95	1.04		
Coniagas	Toronto	4.15	4.00	4.00	May, 1924	0.12½
Keeley	Toronto	1.49	1.40	1.49	Se. 1, Se.15 SA	0.12
Kerr Lake	N. Y. Curb	*87	*80	*82	Oc. 1, Oc.15 SA	0.12½
La Rose	Toronto	*6	*6	*6	Apr., 1922	0.10½
Lorrain Trout Lake	Toronto	*35	*35	*35	Jy. 2, Jy. 15	0.05
McKinley-Dar.-Sav.	Toronto	*9⅛	*8½	*9	Oct., 1920	0.03
Mining Corp. Can.	Toronto	2.90	2.60	2.90	Jy.1, Jy.15 SA	0.12½
Nipissing	N. Y. Curb	5⅜	5	5⅛	Se.30, Oc.20 Q	0.15
Temiskaming	Toronto			*8	Jan., 1920	0.40
SILVER-LEAD						
Ahumada	New York	7⅜	6⅞	7⅛	Se.28, Oc.1, QX	0.25
Alta Merger	Salt Lake	†*4	†*2			
Bingham Mines	Boston	36	35½	35½	Se.20, Se.30 Q	1.00
Cardiff M. & M.	Salt Lake	*27½	*26	*26	Nov., 1924	0.10
Chief Consol.	Salt Lake	2.75	2.75	2.75	De.15, Ja.2 Q	0.75
Consti'n Mng. & Mill'g	Spokane			*50		
Emma Silver	Salt Lake	†1⅛	†*75			
Erupcion	Boston Curb	1¼	1 1/16	1⅛	Se.25, Oc.1, QX	0.10
Federal M. & S.	New York			87		
Federal M. & S., pfd.	New York	71	70	70	Au.25, Se.15 Q	1.75
Hawthorne Mines	N. Y. Curb	*11	*9	*9		
Hecla Mining	N. Y. Curb	16⅜	15⅞	16⅜	Au.14, Se.15 Q	0.50
Highland-Surprise	Spokane	*21	*21	*21		
Iron King Mining	Salt Lake			*24		
Keystone Mining	Salt Lake	*26	*26	*26	Au.12, Au.26	0.07½
Lucky Jim	Spokane	*15	*15	*15		
Lucky-Tiger Com.	Kansas City	†7.25	†6.25		Oc.10, Oc.20 X	0.07
Mammoth Mining	Salt Lake	2.65	2.65	2.65	Mar.24, Apr. 1	0.10
Marsh Mines	Spokane	4	3½	3⅞	Se.15, Oc.19	0.15
Park Utah	New York	6.50	5.40	5.40	Se.15, Oc.1 Q	0.15
Plutus Mining	Salt Lake	...	...	2	Oct. 15, Q	0.15
Prince Cons.	Salt Lake			3		
Silver King Coal	Salt Lake	7.55	7.30	7.55	Se. 20, Oc.1, Q	0.25
Silversmith	Spokane	*39	*37	*37½	Oc.1, Oc.10 Q	0.02
Strattons Mines	Spokane	*41⅞	*40	*40		
Tamarack-Custer	Spokane	*25⅜	*24	*25	Sept., 1924	0.25
Tintic Standard	Salt Lake	10.62½	10.50	10.62½	Se.13, Se.25 QX	0.40
Utah-Apex	Boston	6	5	5	Oc.3, Oc.15 Q	0.25
Western Utah Copper	N. Y. Curb			*5		
IRON						
Bethlehem Steel	New York	45⅞	43½	44⅞	July, 1924	1.25
Cleveland-Cliffs Iron	Cleveland	80	78	78½	Oct., 1926	1.00
Colorado Fuel & Iron	New York	42⅜	37⅜	39	May, 1921	0.75
Gt. North'n Iron Ore	New York	19⅜	18¼	19⅜	Dec., 1925	0.75
Inland Steel	New York	39	38	38½	Au.13, Se.1 Q	0.62½
Mesabi Iron	N. Y. Curb	1⅜	1⅛	1⅛		
Replogle Steel	New York	9¼	8⅝	9		
Republic I. & S.	New York	57	50	56	No.15, De.1 Q	1.00
Republic I. & S. pfd.	New York	97	96¼	96½	De.15, Ja.2 Q	1.75
Sloss-Sheffield S. & I.	New York	121	117	120	Se.10, Se.20 Q	1.50
Sloss-Shef. S.&I. pfd.	New York	104¼	104¼	104¼	Se.20, Oc.1 Q	1.75
U. S. Steel	New York	139⅜	133⅞	138⅞	Se.2, Se.29 Q	1.75
U. S. Steel pfd.	New York	128⅜	127⅛	128⅝	Au.3, Au.30, Q	1.75
Virginia I. C. & C.	New York	47	47	47	Jan., 1924	1.50
Virginia I.C.&C.pfd	New York			72	Jn.1, July 2. SA	2.50
DIAMONDS, PLATINUM, ALUMINUM, VANADIUM						
De Beers Consol.	New York	...	...	38⅜	Ju.16, Ju.17	1.70
So. Am. Gold & P.	N. Y. Curb	4⅛	3⅞	3⅞		
Alum. Co. of Amer.	N.Y.Curb	70	70	70		
Alum. Co. of Amer pf.	N.Y.Curb	102½	101½	102½	Oct. 1, Q,	1.50
Vanadium Corp.	New York	40½	36	40	De.1, De.15, X	1.00
ASBESTOS						
Asbestos Corp., New	Montreal	22½	19⅜	22	Jan., 1926	1.50
Asbestos Corp., pfd.	Montreal	77⅞	73½	76	Jy.1, Jy.15, SA	1.75
SULPHUR						
Freeport Texas	New York	29½	26½	29	Nov., 1919	1.00
Texas Gulf, new	New York	43	41⅜	42	Se.7, Se.15, Q	3.00
MINING, SMELTING, REFINING AND GENERAL						
Amer. Metal	New York	47⅜	45⅜	45⅞	Au.20, Se. 1, Q	1.00
Amer. Metal pfd.	New York			114	Au.21, Se. 1 Q	1.75
Amer. Sm. & Ref.	New York	130½	124½	130	Oc.15, No.1, Q	2.00
Amer. Sm.&Ref.pfd.	New York	120	120	120	No.5, De.1, Q	1.75
Consol. M. & S.	N. Y. Curb			300	Jn.30, Jy.5	SAX 3.75
Federated Metals	N. Y. Curb	12	12	12		
Newmont Mining	N. Y. Curb	76⅛	75	75	Oc.1, Oc.15, Q	0.60
Southwest Metals	N. Y. Curb			1		
U. S. Sm. R. & M.	New York	33	30	31	Oc.7, Oc.15, Q	0.87½
U. S. Sm. R.&M.pfd.	New York	46	44½	44½	Oc.7, Oc.15, Q	0.87½

* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange; Henry Sachs, Colorado Springs, Colo.

PRICE WEEK ENDED OCT. 12, 1926

Name	High	Low	Last	Date	Last Divd. Amount
Aramayo Mines (25 frs.)	79/4½	77/6	78/9	Aug. 1926	15 p.c.†
British Platinum (£1)	4/—	3/1½	4/—	Feb. 1925	2½ p.c.
Burma Corpn. (10 rupees)	15/1½	14/6	14/10½	Aug. 1926	7 annas*
Bwana M'Kubwa (5s)	7/—	6/9	7/—		
Camp Bird (2s)	4/1½	2/7½	2/9		
El Oro (£1)	6/7½	6/—	6/—	Nov. 1924	2½ p.c.*
Esperanza (10s)	—/10½	—/9	—/9		
Frontino & Bolivia (£1)	8/9	8/6	8/9	July 1926	2½ p.c.
Mexican Corpn. (£1)	12/—	11/—	11/3		
Mexico Mines of El Oro (£1)	22/9	21/3	22/6	June 1926	7½ p.c.*
Oroville Dredging (£1)	3/6	2/7½	3/—	1 ec. 1923	3¾ p.c.
Ouro Preto (£1)	2/3	1/10½	2/—	May 1925	2½ p.c.
Rhodesian Congo Border (£1)	119/4½	114/9	115/—		
St. John del Rey (£1)	8/6	8/—	8/6	June 1925	6½ p.c.
San Francisco Mines (10s)	34/3	33/—	33/3	June 1926	15 p.c.
Santa Gertrudis (£1)	14/10½	13/6	14/3	Oct. 1926	3½ p.c.
Selukwe (2s. 6d.)	13/7½	12/9	13/1½	April 1917	6¾ p.c.
S. Amer. Copper (2s.)	4/—	3/6	3/9	Nov. 1917	75 p.c.
Tanganyika (£1)	46/9	40/—	43/9	Aug. 1926	7½ p.c.
Tomboy (£1)	3/4½	3/1½	3/4½	July 1926	10 p.c.
Union Miniere du Haut-Katanga (Brussels)	9.990	9.910	9.990	July 1926	175 (‡)

* Free of British income tax. † Swiss frs. ‡ Belgian frs. and free of taxation